A STUDY ON

"FETOMATERNAL OUTCOME IN HELLP SYNDROME COMPLICATING PREGNANCY"

Dissertation submitted

To

THE TAMILNADU

DR. M.G.R MEDICAL UNIVERSITY, CHENNAI

With partial fulfillment of the regulations

For the award of the degree of

M.S (Obstetrics &Gynaecology)

GOVERNMENT MADRAS MEDICAL COLLEGE

CHENNAI -APRIL 2016

CERTIFICATE

This is to certify that this dissertation is the bonafide work of

DR. V.REKHA

On

"FETOMATERNAL OUTCOME IN HELLP SYNDROME COMPLICATING PREGNANCY

During her course in M.S. Obestetrics&Gynaecology from

July 2013 to April 2016 at Government Madras Medical College and

Institute of Obestetrics&Gynaecology

DR. S.USHARANI M.D DGO DNB

Professor

Institute of Obstetrics &Gynaecology

GovtMadras medical college

Chennai.

DR. BABY VASUMATHI MD, DGO

Director

Institute of Obstetrics &Gynaecology

Govt Madras medical college

Chennai.

DR. R.VIMALA MD

DEAN,

GovtMadras Medical College,

Chennai

CERTIFICATE BY THE GUIDE

This is to certify that the dissertation titled **"FETOMATERNAL OUTCOME IN HELLP SYNDROME COMPLICATING PREGNANCY"** is a bonafide research work done by DR. V.REKHA Post graduate in M.S Obstetrics &Gynaecology, Institute of Obstetrics &Gynaecology, Madras Medical College, Chennai under my direct guidance and supervision in my satisfaction, in partial fulfilment of the requirements for the degree of M.S Obstetrics &Gynaecology.

Date :

Place :

Prof. Dr.S.USHARANI MD DGO DNB

Professor

Institute of Obstetrics &Gynaecology

Chennai

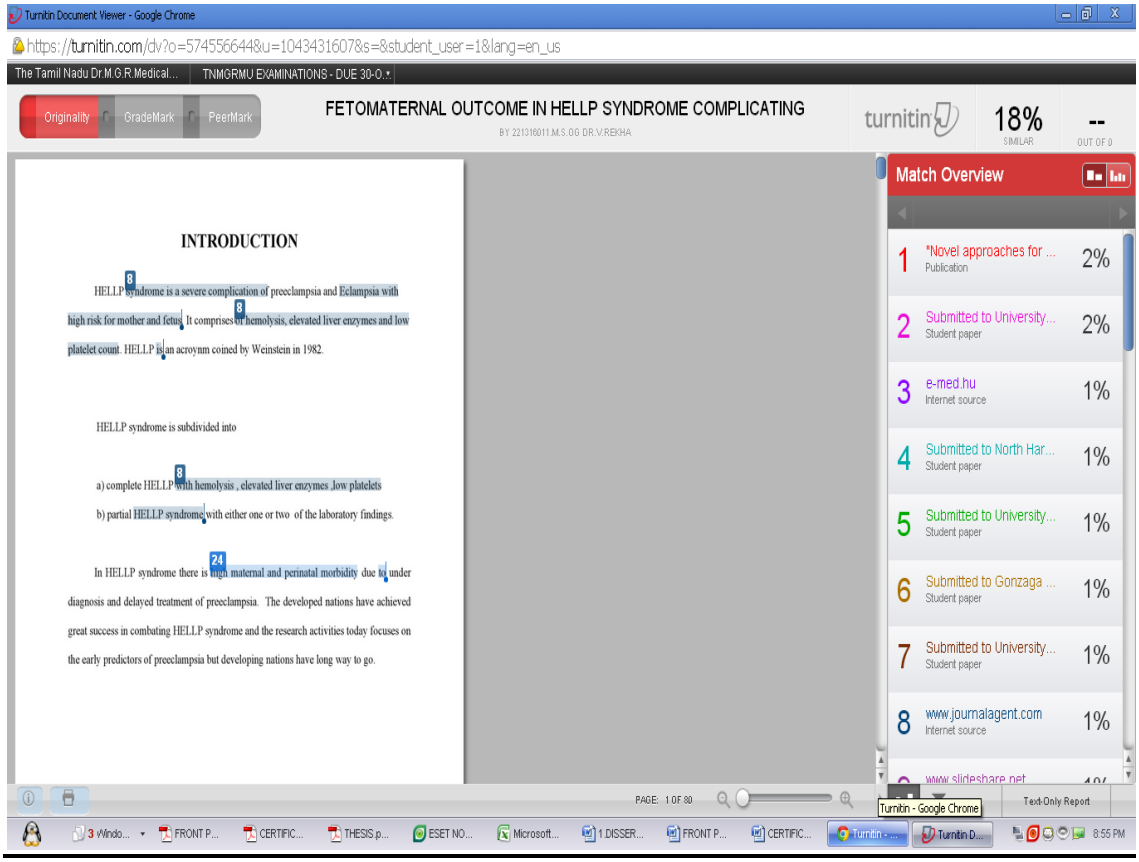
DECLARATION BY THE CANDIDATE

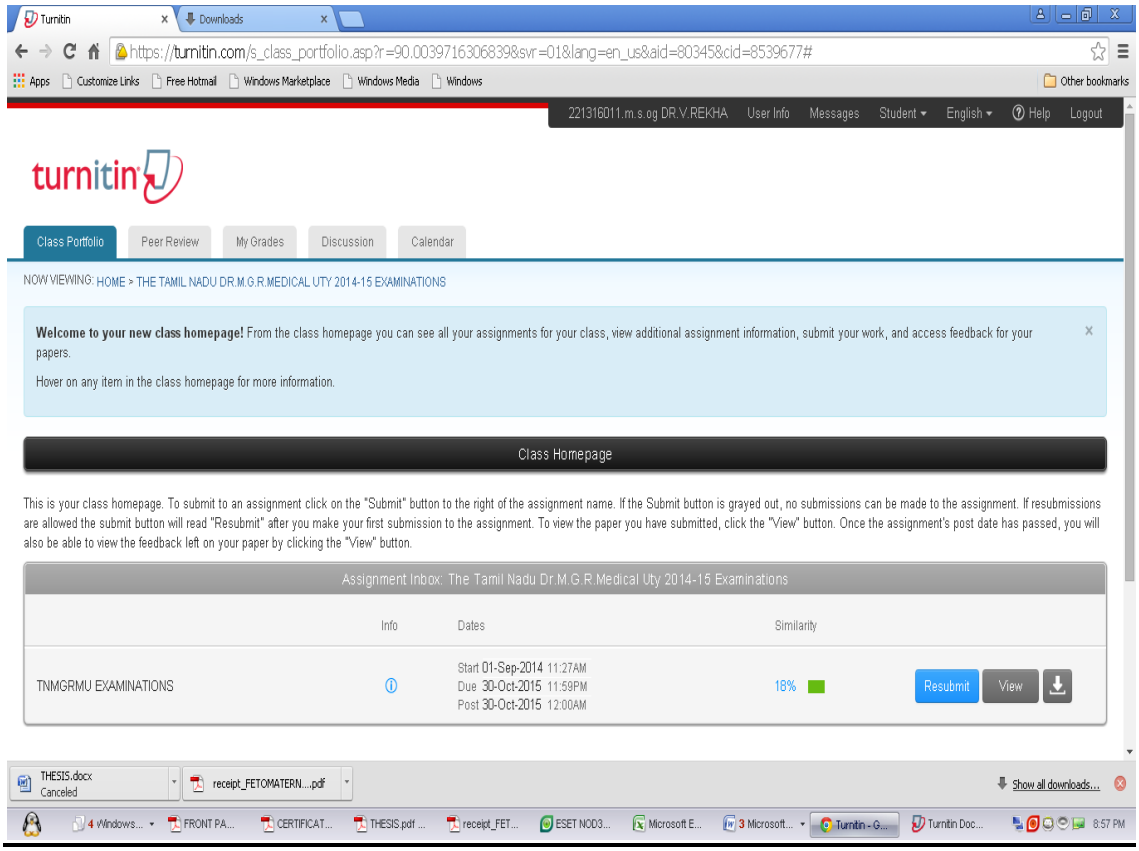
I hereby declare that this dissertation titled **"FETOMATERNAL OUTCOME IN HELLP SYNDROME COMPLICATING PREGNANCY"** is a bonafide and genuine research work carried out by me under the guidance of **Prof. DR S. USHARANI MD DGO DNB** Professor, Institute of Obstetrics &Gynaecology, Chennai.

This dissertation is submitted to **THE TAMILNADU DR. M.G.R. MEDICAL UNIVERSITY CHENNAI** in partial fulfillment of the degree of M.S. Obstetrics & Gynaecology examination to be held in **April 2016.**

Date:

Place: **DR. V. REKHA**


Turnitin Document Viewer - Google Chrome
https://turnitin.com/dv?o=5745566448u=1043431607&s=&student_user=1&lang=en_us
The Tamil Nadu Dr.M.G.R.Medical...
TNMGRMU EXAMINATIONS - DUE 30-0..
Originality
GradeMark
PeerMark
FETOMATERNAL OUTCOME IN HELLP SYNDROME COMPLICATING
BY 221316011.M.S.OG DR.V.REKHA
turnitin
18%
SIMILAR
--
OUT OF 0
INTRODUCTION
HELLP syndrome is a severe complication of preeclampsia and Eclampsia with high risk for mother and fetus. It comprises of hemolysis, elevated liver enzymes and low platelet count. HELLP is an acroynm coined by Weinstein in 1982.
HELLP syndrome is subdivided into
a) complete HELLP with hemolysis , elevated liver enzymes ,low platelets
b) partial HELLP syndrome with either one or two of the laboratory findings.
In HELLP syndrome there is high maternal and perinatal morbidity due to under diagnosis and delayed treatment of preeclampsia. The developed nations have achieved great success in combating HELLP syndrome and the research activities today focuses on the early predictors of preeclampsia but developing nations have long way to go.
Match Overview
1 *Novel approaches for ... Publication 2%
2 Submitted to University... Student paper 2%
3 e-med.hu Internet source 1%
4 Submitted to North Har... Student paper 1%
5 Submitted to University... Student paper 1%
6 Submitted to Gonzaga ... Student paper 1%
7 Submitted to University... Student paper 1%
8 www.journalagent.com Internet source 1%
PAGE: 1 OF 80
Turnitin - Google Chrome
Text-Only Report
8:55 PM


Turnitin
Downloads
https://turnitin.com/s_class_portfolio.asp?r=90.0039716306839&svr=01&lang=en_us&aid=80345&cid=8539677#
Apps
Customize Links
Free Hotmail
Windows Marketplace
Windows Media
Windows
Other bookmarks
221316011.m.s.og DR.V.REKHA
User Info
Messages
Student
English
Help
Logout
turnitin
Class Portfolio
Peer Review
My Grades
Discussion
Calendar
NOW VIEWING: HOME > THE TAMIL NADU DR.M.G.R.MEDICAL UTY 2014-15 EXAMINATIONS
Welcome to your new class homepage! From the class homepage you can see all your assignments for your class, view additional assignment information, submit your work, and access feedback for your papers.
Hover on any item in the class homepage for more information.
Class Homepage
This is your class homepage. To submit to an assignment click on the "Submit" button to the right of the assignment name. If the Submit button is grayed out, no submissions can be made to the assignment. If resubmissions are allowed the submit button will read "Resubmit" after you make your first submission to the assignment. To view the paper you have submitted, click the "View" button. Once the assignment's post date has passed, you will also be able to view the feedback left on your paper by clicking the "View" button.
Assignment Inbox: The Tamil Nadu Dr.M.G.R.Medical Uty 2014-15 Examinations
Info
Dates
Similarity
TNMGRMU EXAMINATIONS
Start 01-Sep-2014 11:27AM
Due 30-Oct-2015 11:59PM
Post 30-Oct-2015 12:00AM
18%
Resubmit
View
THESIS.docx
Canceled
receipt_FETOMATERN....pdf
Show all downloads...
4 Windows...
FRONT PA...
CERTIFICAT...
THESIS.pdf ...
receipt_FET...
ESET NOD3...
Microsoft E...
3 Microsoft...
Turnitin - G...
Turnitin Doc...
8:57 PM

ACKNOWLEDGEMENT

I thank the DEAN of GovtMadras Medical College and Hospital, **DR R.VIMALA MD**for permitting me to conduct this study in the Institute of Obstetrics &Gynaecology, Madras Medical College, Chennai.

I thank **Prof. DR BABY VASUMATHI MD DGO**, Director, Institute of Obstetrics &Gynaecology, for helping and guiding me during the study.

My heartful gratitude to **Prof. DR S. USHARANI MD DGO DNB** Professor, Institute of Obstetrics & Gynaecology, Chennai for her esteemed guidance and valuable suggestions.

I acknowledge the valuable advice and guidance received from **ALL UNIT Chiefs**, Institute of Obstetrics & Gynaecology, Chennai.

I thank **all the Assistant Professors**, Institute of Obstetrics & Gynaecology, Chennai. for their help throughout the study period.

Last but not the least, my heartfelt gratitude to my patients,without whom this study could not have been possible and also to the Medical Records Department, Institute of Obstetrics &Gynaecologyfor their timely help.

CONTENTS

INTRODUCTION

INTRODUCTION

HELLP syndrome is a severe complication of preeclampsia and Eclampsiawith high risk for mother and fetus. It comprisesof hemolysis, elevated liver enzymes and low platelet count. HELLP is an acroynm coined by Weinstein in 1982.

HELLP syndrome is subdivided into

a) complete HELLP with hemolysis , elevated liver enzymes ,low platelets

b) partial HELLP syndrome with either one or two of the laboratory findings.

In HELLP syndrome there is high maternal and perinatal morbidity due to under diagnosis and delayed treatment of preeclampsia. The developed nations have achieved great success in combating HELLP syndrome and the research activities today focuses on the early predictors of preeclampsia but developing nations have long way to go.

AIM OF THE STUDY

1. To study the incidence of HELLP syndrome
2. To analyse the clinical profile of HELLP syndrome cases.
3. To study the maternal and perinatal outcome including morbidity and mortality

The purpose of the study isto appraise ourselves the current incidence of HELLP syndrome and identify the risk factors associated with maternal and perinatal morbidity and mortality. This will guide us in our efforts to decrease the incidence of the disease as well to improve the maternal and perinatal outcome.

MATERIALS AND METHODS

SOURCE OF DATA

Case sheets from the Medical records department in institute of obstetrics and gynaecology , Egmore, Chennai from period of JUNE 2013 to May 2015

A retrospective analysis was done in 86 patients who were diagnosed as HELLP syndrome complicating pregnancy and admitted in Department of Obstetrics and gynaecology, Institute of obstetrics and Gynaecology, Madras Medical College.

A complete review of all clinical case sheets were undertaken regarding the clinical history, examination and diagnostic investigations. Various factors whether independent or dependent were identified which were related to the mortality and morbidity of the fetus and the mother

Inclusion criteria

I. Among the above subjects the women with any or all of the following laboratory criteria are included in the study
   a) Lactate dehydrogenase - > 600 IU/L
   b) SGOT (AST) - > 70 IU/L and SGPT->70 IU/L
   c) Platelet Count < 1,00,000 / mm3

II Gestational age >24 weeks

REVIEW OF LITERATURE

HELLP is a severe form of preeclampsia, which is defined as gestational hypertension accompanied by proteinuria after the 20th week of gestation.

Some believe that HELLP syndrome is adifferent entity and there is no known preventive management.

Etiopathogenesis

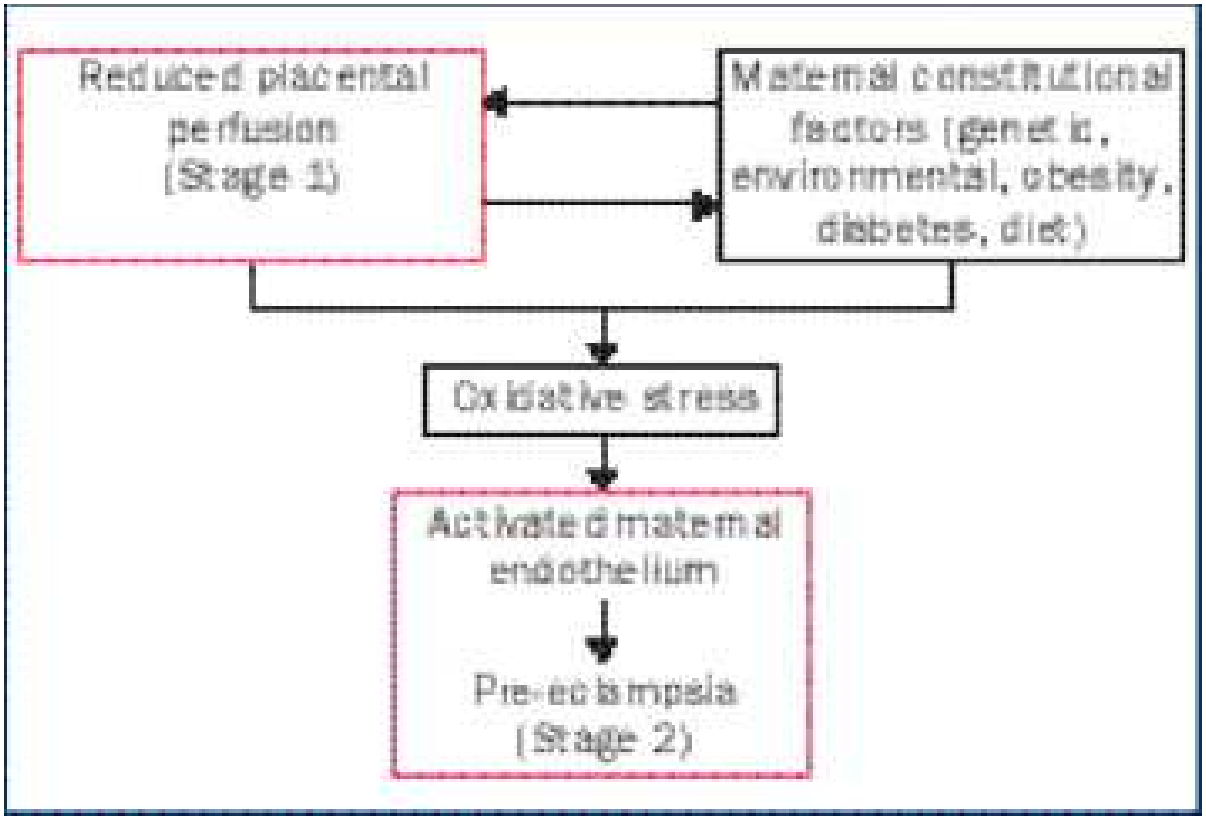
- First time exposure to chorionic villi
- Exposure to abundance of chorionic villi (twins or hydatidiform mole)
- Renal or cardiovascular disease
- Genetically predisposed to develop hypertension

Hypothesis in the development of Preeclampsia

Two-Stage Disorder:

Stage 1: Due to faulty endovascular trophoblastic remodeling , downstreaming to the causes of stage 2 clinical syndrome.

Stage 2: Those with preexisting maternal conditions that include cardiac or renal disease, diabetes, obesity, or hereditary influences



Other hypothesis

Abnormal trophoblastic invasion of uterine vessels

Immunological maladaptive tolerance

Maternal maladaptation to cardiovascular or inflammatory changes of normal pregnancy.

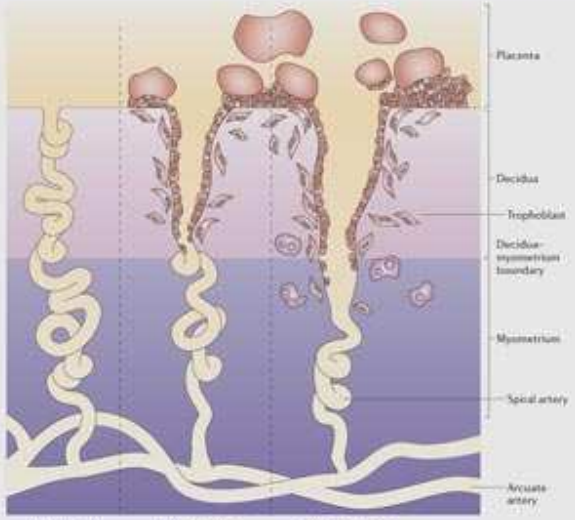
Genetic factors

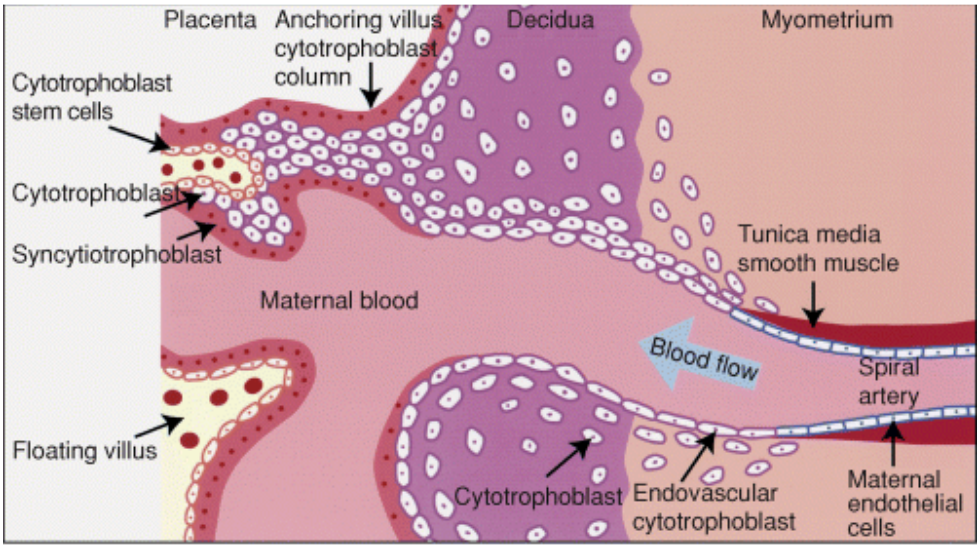
Abnormal Trophoblastic Invasion

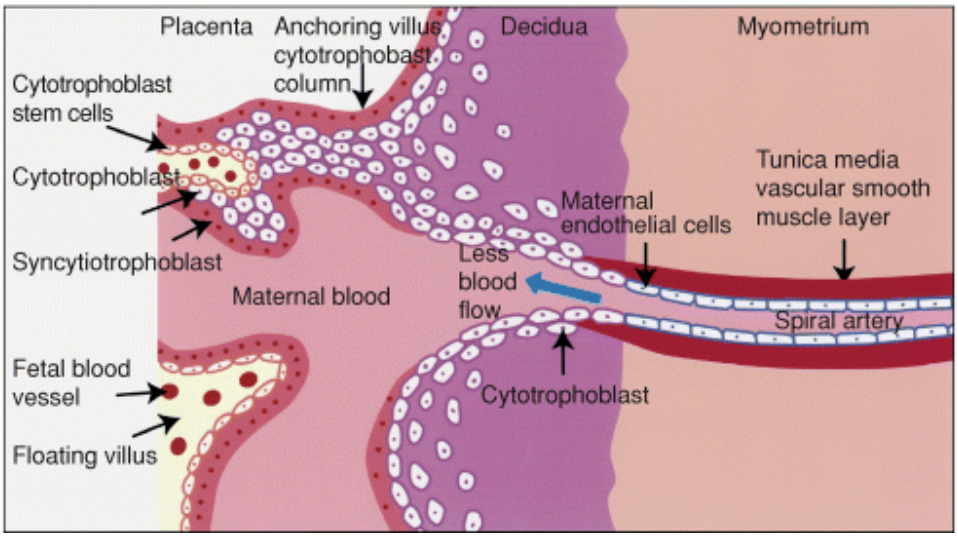
In preeclampsia, there is an incomplete trophoblastic invasionin the decidual vessels but not the myometrial vessels. The deeper myometrial arterioles will not lose their endothelial lining and musculoelastic tissue. Thus the mean external diameter is half the vessels in normal placentas.

Defective trophoblastic invasion of the spiral arteries correlates with the severity of the hypertensive disorder.

FIGURE 5 Spiral Artery Remodeling in Preeclampsia and Normal Pregnancy (Used by permission)




Placenta
Anchoring villus
cytotrophoblast
column
Decidua
Myometrium
Cytotrophoblast
stem cells
Cytotrophoblast
Syncytiotrophoblast
Tunica media
smooth muscle
Maternal blood
Blood flow
Spiral
artery
Floating villus
Cytotrophoblast
Endovascular
cytotrophoblast
Maternal
endothelial
cells


Placenta
Anchoring villus
cytotrophobast
column
Decidua
Myometrium
Cytotrophoblast
stem cells
Cytotrophoblast
Syncytiotrophoblast
Maternal blood
Maternal
endothelial cells
Tunica media
vascular smooth
muscle layer
Less
blood
flow
Spiral artery
Fetal blood
vessel
Floating villus
Cytotrophoblast

Immunological Factors

Loss of Maternal immune tolerance to paternally derived placental and fetal antigens can cause preeclampsia syndrome.

Immunogenetic factors:

"Immunization" from a prior gestation

Inherited haplotypes HLA-A, -B, -D, -I a , -II

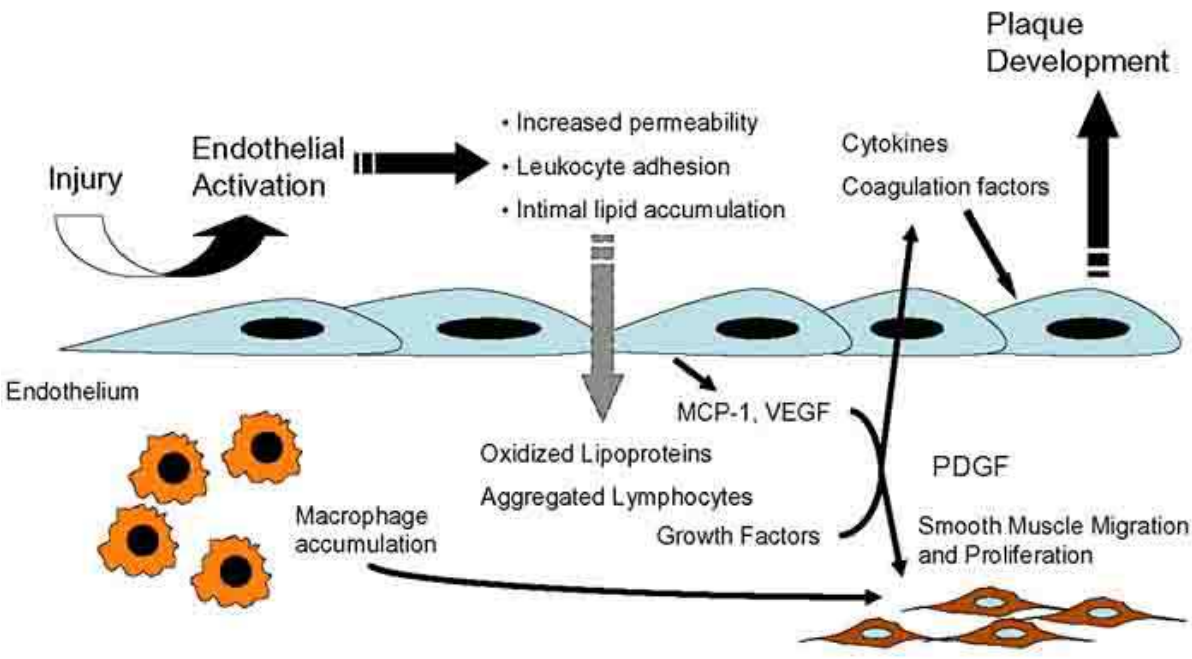
NK-cell receptor haplotypes

Susceptibility genes for diabetes and chronic hypertension

Endothelial Cell Activation

Endothelial cell dysfunction is due to an extreme activation of leukocytes in the maternal circulation .Cytokines such as tumor necrosis factor-(TNF)and the interleukins (IL) contribute to the oxidative stress in preeclampsia. The reactive oxygen species and free radicals lead to self-propagating lipid peroxides formation generating highly toxic radicals causing

- Injury to endothelial cells.
- Modifying their nitric oxide production.
- Interfering with prostaglandin balance.
- Activation of microvascular coagulation manifesting as thrombocytopenia;
- Increased capillary permeability leading to edema and proteinuria.



Nutritional Factors

Fruits and vegetables that have antioxidant activity is associated with decreased blood pressure.

Genetic Factors

Preeclampsia is a multifactorial, polygenic disorder.

- Incident risk for preeclampsia is 20 to 40 percent for daughters of preeclamptic mothers;
- 11 to 37 percent for sisters of preeclamptic women; and
- 22 to 47 percent in twin studies.
- 60-percent concordance in monozygotic female twin pairs.

Genes Associated with Preeclampsia Syndrome

Methylene tetrahydrofolate reductase	-	MTHFR (C677T)
Factor V_{Leiden}	-	F5 (Leiden)
Angiotensinogen	-	AGT (M235T)
Human leukocyte antigens	-	HLA (Various)
Endothelial nitric oxide	-	NOS3 (Glu 298 As)
Prothrombin (factor II)	-	F2 (G20210A)
Angiotensin-converting enzyme	-	ACE (I/D^{at}Intron 16)

Other Genetic Variables

1. Multiple genotypes: maternal and paternal (fetal and placental)
2. Subgroups: associated disorders such as diabetes, parity
3. Genomic ethnicity: frequency of polymorphisms, genetic drift, founder effect, and selection
4. Gene-gene interaction: specific alleles or products of two or more genes affect one another and their phenotype
5. Epigenetic phenomena: variable expression of a functional stable gene, eg: monozygotic twin differences
6. Gene-environmental interactions - infinite.

Pathogenesis

Vasospasm

Vascular constriction causes increased resistance and hypertension. Endothelial cell damage causes interstitial leakage through which blood constituents, including platelets and fibrinogen, are deposited subendothelially leading to disruption of endothelial junctional proteins. Diminished blood flow causes maldistribution, ischemia of the surrounding tissues leading to necrosis, hemorrhage, and other end-organ disturbances.

Endothelial Cell Activation

Intact endothelium has anticoagulant properties, and blunt the response of vascular smooth muscle to agonists by releasing nitric oxide. Damaged or activated endothelial cells produce less nitric oxide and secrete substances that promote coagulation and increase sensitivity to and elevated blood concentrations of substances associated with endothelial activation.

Increased Pressor Responses

Renin, Angiotensin II, and Plasma Volume normally develop refractoriness to infused vasopressors during pregnancy .In early preeclampsia, there is an increased vascular reactivity to infused norepinephrine and angiotensin II but normotensive nulliparas remained refractory to infused angiotensin II. Those who became hypertensive lost this refractoriness several weeks before the onset of hypertension

Prostaglandins

In preeclampsia the following changes occur as early as 22weeks.

- Endothelial prostacyclin (PGI2) production is decreased .

- Thromboxane A_2 secretion by platelets is increased

- Prostacyclin :thromboxane A_2 ratio decreased

Nitric Oxide

- Nitric oxide is a potent vasodilator
- Synthesized from L-arginine by endothelial cells.
- It maintains the normal low-pressure vasodilated state .
- In preeclampsia there is decreased endothelial nitric oxide synthase expression, causing increased nitric oxide inactivation.

Endothelins

- It is a 21-amino acid peptides
- Endothelins are potent vasoconstrictor
- Endothelin-1 (ET-1) is produced in endothelium .
- Plasma ET-1 levels are increased in normotensive pregnant women, but women with preeclampsia have even higher levels .
- Magnesium sulfate lowers ET-1 concentration

Angiogenic and Antiangiogenic Proteins

- Placental vasculogenesis is by 21 days after conception.
- Proangiogenic and antiangiogenic substances involved in placental vascular development.
- Angiogenic imbalance is excessive amounts of antiangiogenic factors that are stimulated by worsening hypoxia at the uteroplacental interface.

Trophoblastic tissue of preeclampsia patient overproduces at least two antiangiogenic peptides that enter the maternal circulation.

1. **Soluble Fms-like tyrosine kinase 1 (sFlt-1)**

    - It is a variant of the Flt-1 receptor for placental growth factor (PlGF) and vascular endothelial growth factor (VEGF).
    - Increased maternal sFlt-1 levels inactivate and decrease circulating free PlGF and VEGF concentrations leading to endothelial dysfunction.
    - sFlt-1 levels increases in maternal serum months before preeclampsia is evident.

2. **Soluble endoglin (sEng)**

- It is derived from placenta.
- 65-kDa molecule
- It is also called as CD105
- Acts as a co-receptor for the TGF family.
- Inhibits TGF isotopes from binding to endothelial receptors, resulting in decreased endothelial nitric oxide-dependent vasodilatation
- Serum levels begin to increase months before clinical preeclampsia develops.

Retrospective studies show third-trimester elevation of Sflt-1 levels and decreased PlGF concentrations correlate with preeclampsia development after 25 weeks.

Epidemiology

- HELLP syndrome occurs in 0.1%-0.6% of all pregnancies.
- Occurs in 4%-12% of patients with preeclampsia.
- HELLP syndrome typically occurs between week 27 of gestation and delivery
- In immediate postpartum period it is about 15%-30%

The incidence of HELLP syndrome is significantly higher in whites and women of European descent.

HELLP has been shown to occur in older maternal age groups, with a mean age of 25 years. In contrast, preeclampsia is most common in younger patients (mean age, 19 years)

Maternal

Maternal mortality ranges from 1%-3%.Class 1 or complete HELLP is associated with the highest incidence of maternal morbidity and mortality. Sixty percent of deaths occur in patients with class 1 disease; cerebral hemorrhage is the most common autopsy finding.

Morbidity includes the following

- Disseminated intravascular coagulation (DIC) (20%)
- Placental abruption (16%)
- Acute renal failure (7%)
- Pulmonary edema (6%)

Neonatal

Fetal morbidity and mortality rates range from 9%-24% and usually result from placental abruption, intrauterine asphyxia, or prematurity.

Clinical Presentation

HELLP syndrome typically occurs between 27 weeks' gestation and delivery in women with a mean age of 25 years. A complete review of systems may reveal malaise, nausea, vomiting, weight gain, and various other nonspecific symptoms.

A wide range of symptoms, none of which are diagnostic, may be present in persons with HELLP syndrome. For instance, nausea, vomiting, and epigastric and right upper quadrant pain has been reported in 30%-90% of patients, headache in 33%-68%, visual changes in 10%-20%, and jaundice in 5%.

In a series by Sibai et al, most patients with HELLP syndrome presented with complaints of epigastric or right upper quadrant pain and nonspecific viral syndrome types of symptoms. In earlier studies by Weinstein, nausea, vomiting, and epigastric pain were found to be the most common symptoms in patients with HELLP symptoms.

Common history findings are as follows:

- Malaise
- Nausea and vomiting
- Edema with secondary weight gain
- Epigastric or right upper quadrant pain
- Dyspnea (if pulmonary edema present)

Physical Examination

A complete physical examination may reveal signs of dehydration, including dry mucous membranes, sunken eyes, weakness, and imbalance secondary to dizziness from excessive vomiting. Vital signs may reveal tachycardia, tachypnea, and hypertension.

Patients with HELLP syndrome show various signs and symptoms, many of which are synonymous with preeclampsia. Proteinuria is shown to be present in 86% -100% of patients and hypertension in 80%. However, it should be noted that 15% of patients do not present with either.

In addition, 55%-67% of patients present with nondependent edema, which can be periorbital or in the upper and lower extremities. Right upper quadrant tenderness is found in 65%-90% of patients, while jaundice is evident in 5% of patients. A lung examination may reveal crackles if pulmonary edema is present.

Vital signs may include the following

- Hypertension
- Tachycardia
- Tachypnea

Generalized findings may include the following

- Fatigue or weakness
- Distress due to pain
- Jaundice

Head, ears, eyes, nose and throat findings may include the following

- Signs of dehydration including sunken eyes
- Edema leading to puffy eyes
- Dry mucous membrane

Pulmonary findings may include crackles secondary to non cardiogenic pulmonary edema. Abdominal findings may include right upper quadrant to epigastric tenderness.

Extremities findings may include edema.

Complications

Maternal complications of HELLP syndrome may include the following:

- Hematologic: DIC, bleeding, hematoma
- Cardiac: Cardiac arrest, myocardial ischemia
- Pulmonary: Pulmonary edema, respiratory failure, pulmonary embolism, adult respiratory distress syndrome (ARDS)
- CNS: Hemorrhage/stroke, cerebral edema, central venous thrombosis, seizures, retinal detachment
- Renal: Acute renal failure, chronic renal failure requiring dialysis
- Hepatic: Hepatic (usually subcapsular) hematoma with possible rupture, ascites, nephrogenic diabetes insipidus
- Infection

Neonatal complications of HELLP syndrome may include the following:

- Prematurity
- Intrauterine growth retardation (39%)
- Thrombocytopenia (one third of neonates born to patients with HELLP; 4% of these infants will have intraventricular hemorrhage)

Differential Diagnosis

- Abruptio Placentae
- Acute Fatty Liver of Pregnancy
- Anemia and Thrombocytopenia in Pregnancy
- Antiphospholipid Syndrome and Pregnancy
- Eclampsia
- Hemolytic Anemia
- Hemolytic-Uremic Syndrome
- Hyperemesis Gravidarum
- Hypertension and Pregnancy
- Nephrolithiasis
- Peptic Ulcer Disease
- Preeclampsia
- Thrombocytopenia in Pregnancy
- Thrombotic Thrombocytopenic Purpura
- Viral Hepatitis

Imaging Studies

A large-vessel vasculopathy could result in hepatic infarction or subcapsular hematomas. If suspected (usually correlated with worsening hepatic function test results), CT scanning or MRI should be obtained. Hepatic ultrasonography may reveal increased echogenicity in irregular, well-demarcated areas of the liver.

Histologic Findings

Hepatic endothelial disruption and subsequent platelet activation, aggregation, and consumption lead to distal ischemia and hepatocyte death, which can be segmental or apparent diffusely throughout the liver. HELLP tends to involve smaller terminal arterioles, characteristic histiologic features are periportal or focal parenchymal necrosis with hyaline deposits of fibrin like material in the sinusoids.

If larger-vessel vasculopathy occurs, hepatic infarction or subcapsular hematomas may result, both of which would require imaging studies such as MRI or CT scanning.

Staging

Two common classifications used to predict maternal morbidity and mortality were described in and are known as the Mississippi and the Tennessee classifications.

The two methods of classification is useful, but not regarded as a hard and fast rule. Partial HELLP syndrome, can progress to the complete form. In addition, increased eclampsia and higher perinatal morbidity and mortality have been demonstrated in patients with HELLP syndrome, while those with Mississippi class 3 disease have been shown to exhibit hepatic rupture.

Mississippi classification

The Mississippi classification divides HELLP syndrome into 3 classes based on platelet count, AST or ALT levels, and LDH levels.

Class 1: Approximately has 13% incidence of bleeding, associated with the highest maternal morbidity and mortality rates and longest recovery time. Patients in this class have a platelet count less than 50,000/µL, liver dysfunction with AST or ALT levels greater than 70 IU/L, and hemolysis as evidenced by an LDH level greater than 600 IU/L.

Class 2 :Includes platelet counts from 50,000-100,000/µL with AST, ALT, and LDH levels similar to those in class 1. Class 2 has an 8% incidence of bleeding.

Class 3 : The mild form of HELLP, has a platelet count from 100,000-150,000/µL, AST and ALT greater than 40 IU/L, and LDH greater than 600 IU/L, with no increased risk of bleeding. The more severe the class, the longer the recovery time postpartum.

Mississippi Classification of HELLP Syndrome

	Class 1 (Severe)	**Class 2 (Moderate)**	**Class 3 (Mild)**
Platelets	≤50,000/µL	50,000-100,000/µL	100,000-150,000/µL
AST or ALT	≥70 IU/L	≥70 IU/L	≥40 IU/L
LDH	≥600 IU/L	≥600 IU/L	≥600 IU/L
Incidence of bleeding	13%	8%	No increased risk

Tennessee classification

The Tennessee classification describes HELLP as either complete or partial.

Complete HELLP is defined as hemolysis with an abnormal peripheral smear finding and an LDH level greater than 600 IU/L or bilirubin level greater than 1.2 mg/dL. Patients with complete HELLP have platelet counts less than 100,000/µL and AST levels over 70 IU/L.

Partial HELLP describes severe preeclampsia with features of HELLP as LP, or low platelet syndrome (slightly thrombocytopenic but no hemolysis or liver dysfunction); EL, or elevated liver enzyme syndrome (mildly elevated liver enzymes but no hemolysis or thrombocytopenia); HEL syndrome (hemolysis, elevated liver enzyme levels, but no thrombocytopenia); and ELLP syndrome (elevated liver enzyme levels and low platelet counts, no hemolysis).

Complete HELLP syndrome is characterized by the following:

- Platelet count of 100,000/µL or less
- AST or ALT levels of 70 IU/L or more
- LDH (or bilirubin) (with hemolysis as evidenced on abnormal peripheral smear) levels of 600 IU/L (≥0.2 mg/dL) or more

Partial HELLP syndrome is characterized by severe preeclampsia plus one of the following:

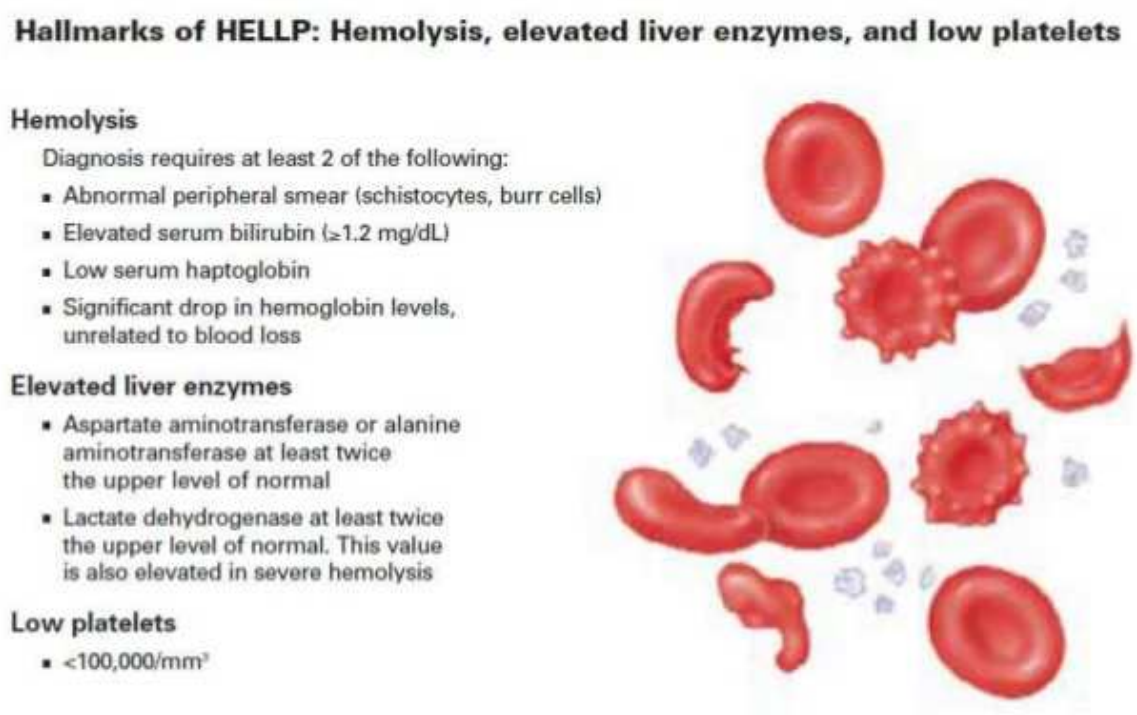
- ELLP: Elevated liver enzyme levels, thrombocytopenia, no hemolysis
- EL: Mildly elevated liver enzyme levels, no thrombocytopenia, no hemolysis
- LP: Thrombocytopenia, no hemolysis, normal liver enzyme levels
- HEL: Hemolysis, liver dysfunction, no thrombocytopenia

Laboratory Studies

Laboratory evaluation should include the following:

- Blood Typing and screening
- Complete blood cell count: Thrombocytopenia, anemia with reticulocytosis
- Coagulation studies: Normal prothrombin time, 50% may have prolonged activated partial thromboplastin time
- Peripheral smear: Schistocytes, helmet cells, and burr cells secondary to microangiopathic hemolytic anemia
- Serum aspartate aminotransferase/alanine aminotransferase (AST/ALT) levels: Elevated secondary to liver dysfunction
- Lactate dehydrogenase (LDH) level: Elevated secondary to liver dysfunction or hemolysis

- Complete metabolic panel (CMP): Elevated blood urea nitrogen (BUN)/creatinine with acute renal failure
- Bilirubin level: Increased secondary to hemolysis



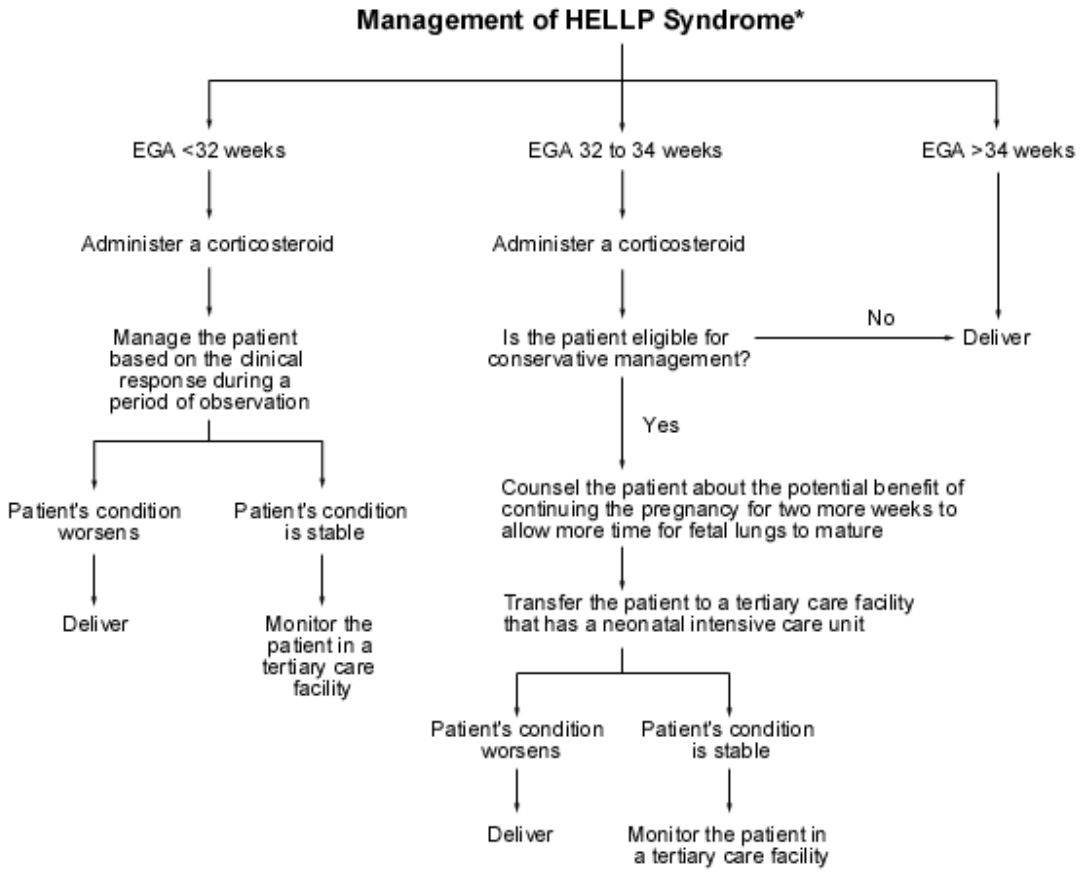
- Haptoglobin level: Decreased secondary to hemolysis
- Fibrinogen levels: Low secondary to increased coagulation
- D-dimer: Increased due to fibrinolysis/DIC

Laboratory abnormalities apparent in HELLP syndrome and the recovery time postpartum required for normalization of these findings are summarized

Laboratory Findings in HELLP Syndrome

Laboratory Test	**Possible Result**	**Cause**	**Recovery to Baseline (in Number of Hours or Days Postpartum)**
Haptoglobin	↓	Hemolysis	24-30 hours
LDH	↑	Hemolysis or liver dysfunction	3-5 days
AST or ALT	↑	Liver dysfunction	3-5 days
Bilirubin	↑	Hemolysis	-
Platelets (CBC)	↓	Consumption	6-11 days
Hemoglobin/Hematocrit (CBC)	↓	Hemolysis	-
PT	Normal		
PTT	↑	Liver dysfunction	-
D-dimer	↑	Increased coagulation and secondary fibrinolysis	-
Fibrinogen	↓		-

Management



Stabilization

Stabilization of the patient begins in the prehospital setting before coming to the hospital. In the Emergency department management should begin for prophylaxis of seizure, control of hypertension, resuscitation with blood products, as indicated, and stabilization of general condition of the patient condition.

Intravenous fluids should be given cautiously (volume overload should be kept in mind)

Seizure prophylaxis

Intravenous magnesium sulfate (given till 24 hours after delivery). The dosage is a 4-g loading dose over 20 minutes with a 1-g per hour maintenance dose.

Treatment of hypertension

Goal is to keep the systolic less than 160mm Hg and the diastolic less than 100mmHg. Labetalol and hydralazine are the recommended drugs.

Corticosteroid Therapy

Steroids are beleived to alter the degree of intravascular endothelial injury and prevent further hepatocyte death and platelet activation. Improved platelet counts, blood pressureurine output and liver functionhas been noted in the use of high-dose dexamethasone. Intravenous glucocorticoids appear superior to intramuscular steroid.Steroids are also improve fetal morbidity by reducing the incidence of respiratory distress syndrome and intraventricular hemorrhage, as well as maternal morbidity.

Dosage for high-risk patients with platelet count < 20,000 or CNS dysfunction: 20 mg IV dexamethasone every 6 hours for up to 4 doses

Dosage for all other patients with HELLP syndrome: 10 mg IV dexamethasone every 6 hours for 2 doses then 6 mg IV dexamethasone every 6 hours for 2 doses.

Delivery

Once stabilized, the patient should be transferred to a labor room . Delivery is indicated if HELLP syndrome occurs close to 34 weeks gestation, in the setting of fetal lung maturity, or upon evidence of significant maternal or fetal distress before 34 weeks gestation. Steroids administered antenatally may increase the platelet count so that regional anesthesia can be given.

General guidelines are as follows:

- If at 34 weeks gestation or later and unstable, deliver immediately
- If at 34 weeks gestation or later and stable, consider administration of steroids; evaluate over 24-48 hours and deliver
- If at 24-34 weeks gestation and stable, consider administration of steroids; wait 24-48 hours and evaluate for delivery based on the maternal-fetal condition
- If 34 week gestation or earlier with evidence of maternal or fetal distress, deliver immediately.

Vaginal delivery or Cesarean versus is determined based on

- Cervical ripening
- Fetal nonstress test or biophysical profile results
- Umbilical artery Doppler study

If there is a preterm gestation with intrauterine growth restriction or significantly abnormal Doppler test results, cesarean section should be performed.

Cesarean section

Thrombocytopenia should be corrected. Platelets should be transfused and caution is kept to increased consumption of these platelets.

A recommended dose is 6-10 U of platelets with thrombocytopenia of less than 40,000/µL. General anesthesiashould be performed for thrombocytopenia of less than 75,000/µL.Hematoma formation at the operative site occurs in 20% of cases.,An open bladder flap is recommended to reduce this risk, and a subfascial drain can be used for 24-48 hours.

Prognosis

Most patients with HELLP syndrome stabilize within 24-48 hours, with the most protracted postpartum recovery time in patients with class 1 disease.The recurrence rate is 2%-27% in subsequent pregnancies.

Patients are at increased risk of preeclampsia orpregnancy - induced hypertension, preterm delivery, fetal growth restriction, and placental abruption in future pregnancies.

Women with HELLP syndrome are also at increased risk of developing hypertension and cardiovascular disease.

1. **Shafika banoo, Tanuja Amni, Makhdoomi, Shahida Mir, Javid A Malik.**

   Reportedon incidence of HELLP syndrome. 10 cases of HELLP was reported in 100 severe preeclampsia and no maternal death . They also noticed that perinatal outcome was adversely affected and mortality as high as 20 %.

   They recommended all pregnant women having nonspecific symptoms like fatigue malaise, vomiting, headache abdominal pain, jaundice, edema, convulsions should have complete blood count, liver function test and hemolytic profile irrespective of blood pressure.

2. **Gonca Ayse IMIR, Iclal OZDEMIR, Kenan KAYGUSUZ, et al**

   Analysed 64 HELLP syndrome complicating pregnancies retrospectively and reported the incidence of about 2 to 30 %, maternal mortality 0 – 24 %, perinatal mortality of about 8 – 37 %.

   They concluded that the incidence of serious maternal and fetal morbidities and mortalities were increased in HELLP syndrome.

3. **Kaur Amrit Pal, Saini A.S, Dihllon S.P.S, J. Obstetrics Gynecol . India 2003.**

   Analysed 1084 women in 1 year, of which 75 women developed hypertensive disorder, and 3 had HELLP and 37 had partial HELLP. Perinatal mortality was 66.7 % in complete HELLP, 32.43% in partial HELLP and 21.3% in hypertensive disorders.

   They concluded early detection and treatment of hypertensive disorder and its complications needed to reduce the maternal and perinatal morbidity and mortality.

4. **Christy M. Isler,Brain K. Rinehart,MD,Dom A. Terrone, Rick W. Martin, Everett F. Magann, MD, James N. Martin**

   Studied 54 maternal death due to HELLP syndrome according to HELLP syndrome classification based on platelet count.

   The causes of maternal death were cerebral hemorrhage(45%)
   Cardiopulmonary arrest(40%) DIC(34%)ARDS (28%) Renal failure(28%) sepsis(23%). Delay in diagnosis of HELLP syndrome was found in 22 of 43 deaths (51%)

They concluded 1) most maternal deaths occurred among women with class 1 HELLP syndrome, 2) Delay in diagnosis was associated with mortality.

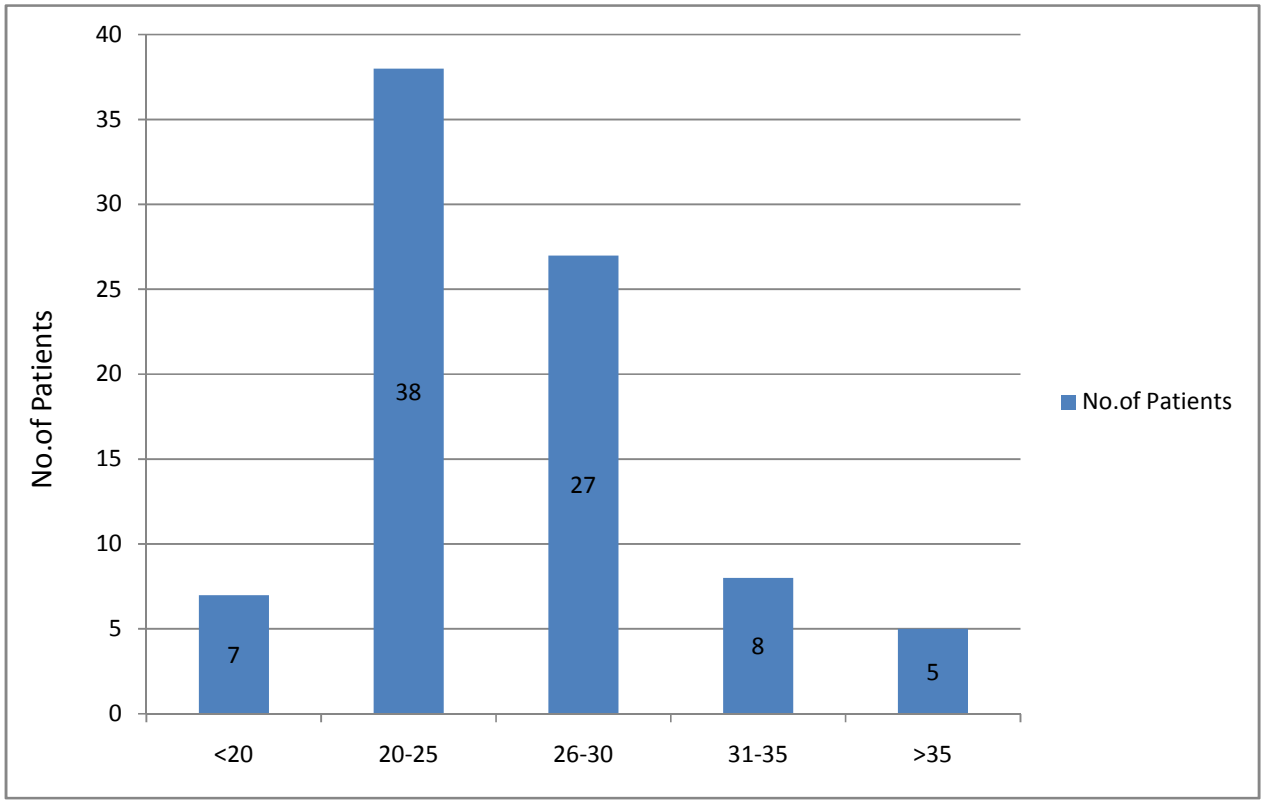
5. **James N Martin, Pamela G Blake, MSN, Kenneth G Perry, James F McCaul, L. Wayne Hess. Rick W Martin**

They studied the natural history of HELLP syndrome in 158 patients retrospectively and found in HELLP syndrome complicated pregnancy have decreased platelet counts while lactate dehydrogenase concentration peaks in 24 to 48 hours postpartum. In patients who recovered, the platelet count > 1,00,000 / mm3 was spontaneously achieved by the sixth postpartum day or within 72 hours of platelet nadir.

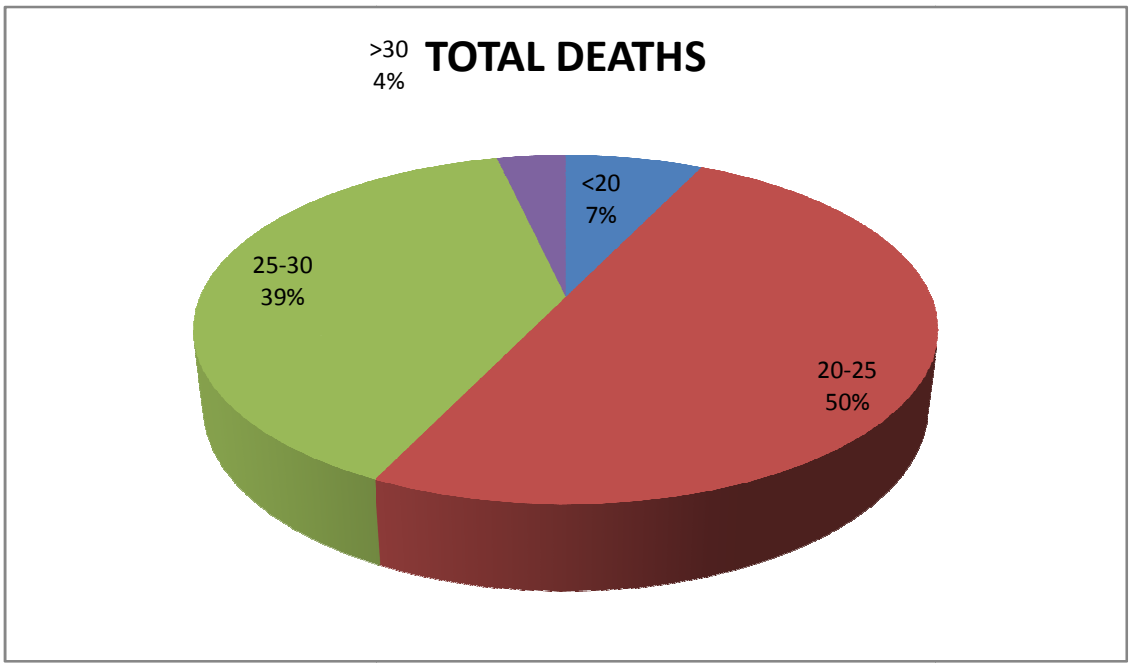
RESULTS & DISCUSSION

During the study period between July 2013 to June 2015 there were about 27064 deliveries. Among these there was an incidence of 1824 severe preeclampsia cases which is about 6.7% of total deliveries. Among 1824 cases of severe preeclampsia there is an incidence of 86 cases of HELLP Syndrome which amounts to 4.7% in severe preeclampsia group and 0.31% of the total deliveries.

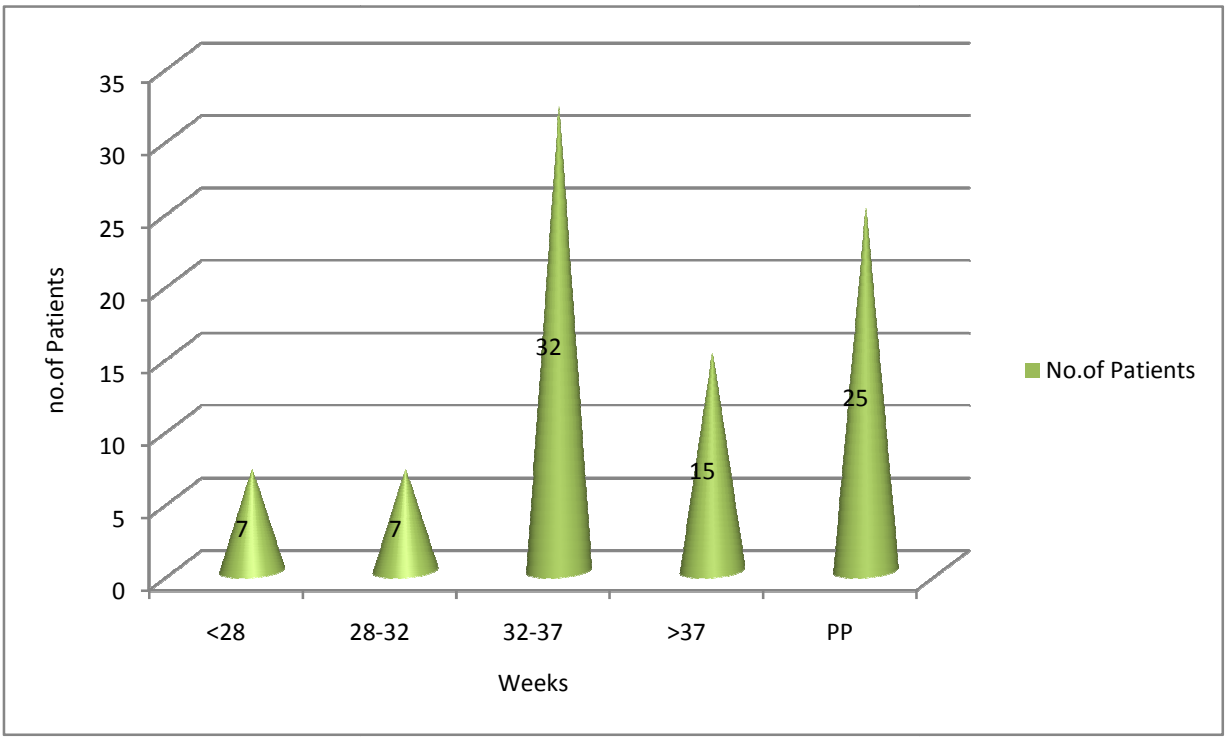
Age Distribution



The age distribution of HELLP Syndrome in our study is maximum between 20-25 years and it was about 38persons (44%). When comparing the age group with the total death (28 persons), most of the patients died were in the age group 20yrs – 25 yrs (14 patients/50%). 11 patients died were in the age group 26yrs-30yrs (39%). This is shown in the pie chart below.

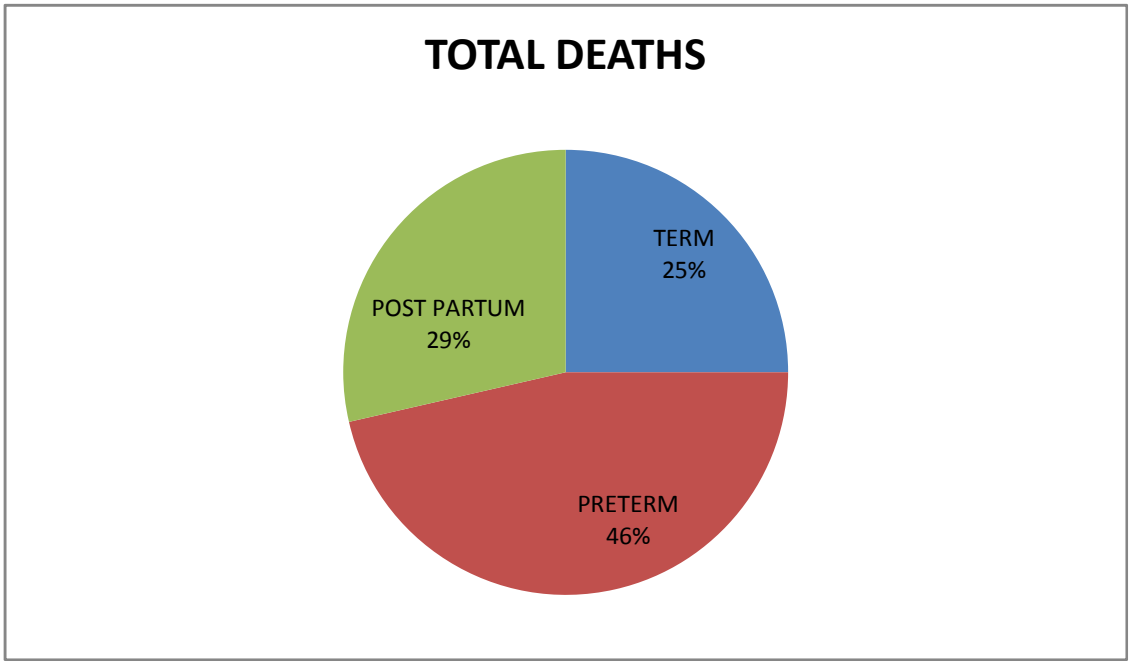

TOTAL DEATHS
>30
4%
<20
7%
25-30
39%
20-25
50%

Comparison of Weeks of GESTATION

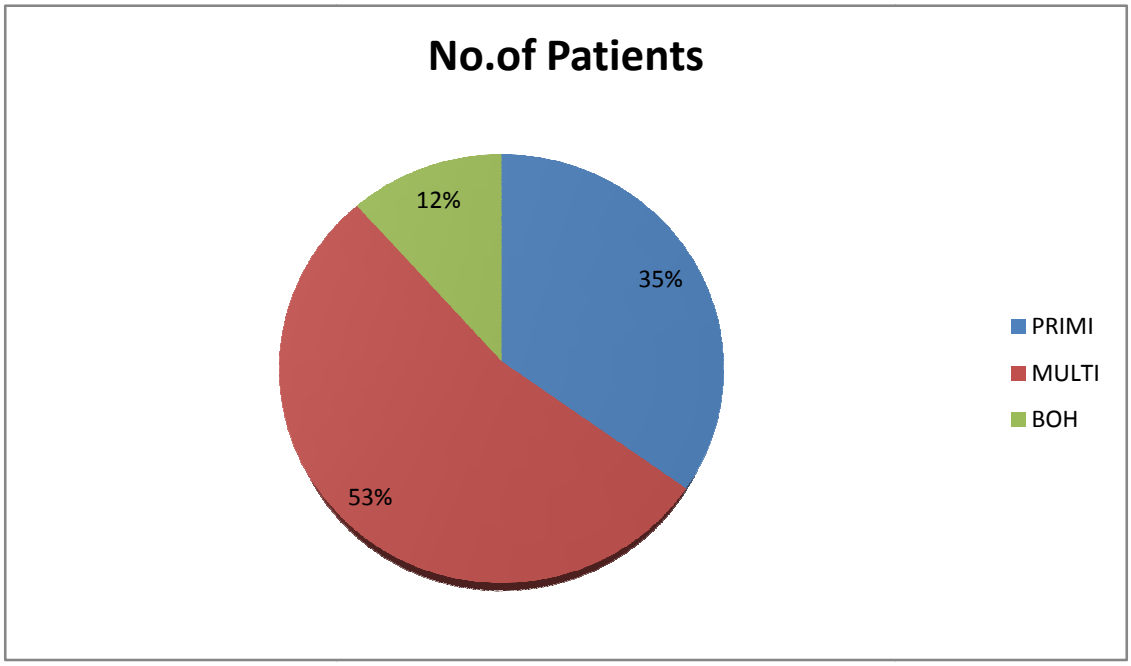


In comparing the weeks of gestation in our study we found that most of the patients were in 32-37 weeks of gestation (32 patients/37%).Two thirds of the patients were in the antenatal period. Remaining one third were in the post partum period.

When comparing with the total death 46% of death were before 37 weeks of gestation. 29% of deaths the incidence was in the postpartum period. This shown in the pie chart below.


TOTAL DEATHS
TERM
25%
POST PARTUM
29%
PRETERM
46%

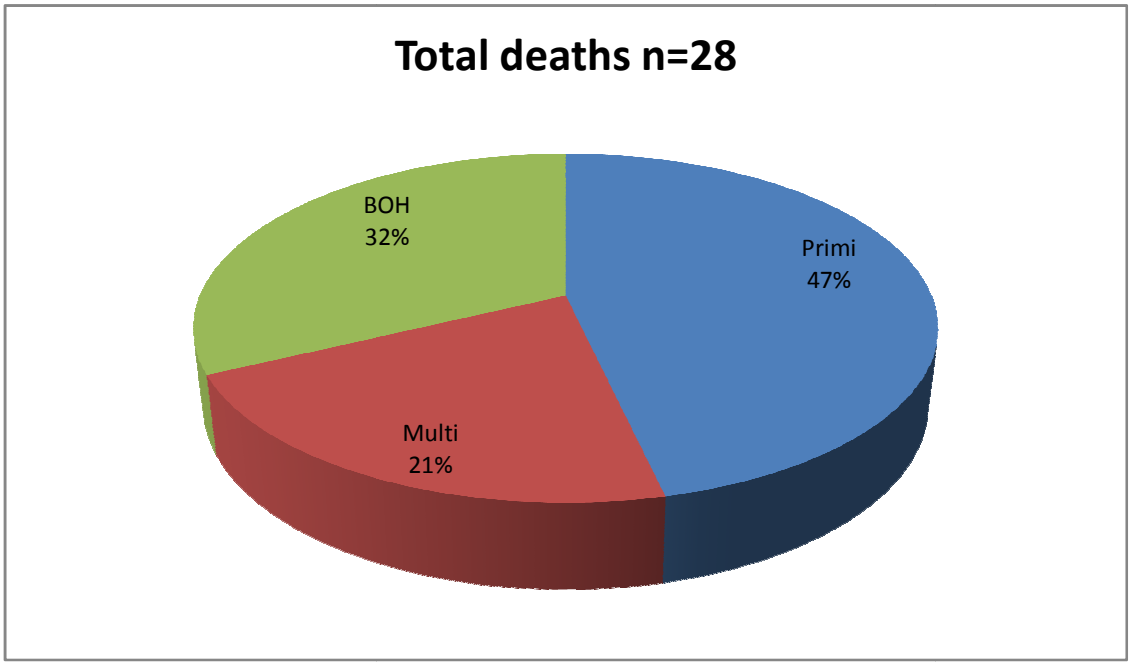
Comparing the obs code with the incidence of HELLP syndrome



Obs.code	No.of Patients	Percentage
PRIMI	30	35%
MULTIPARA	46	53%
BOH	10	12%

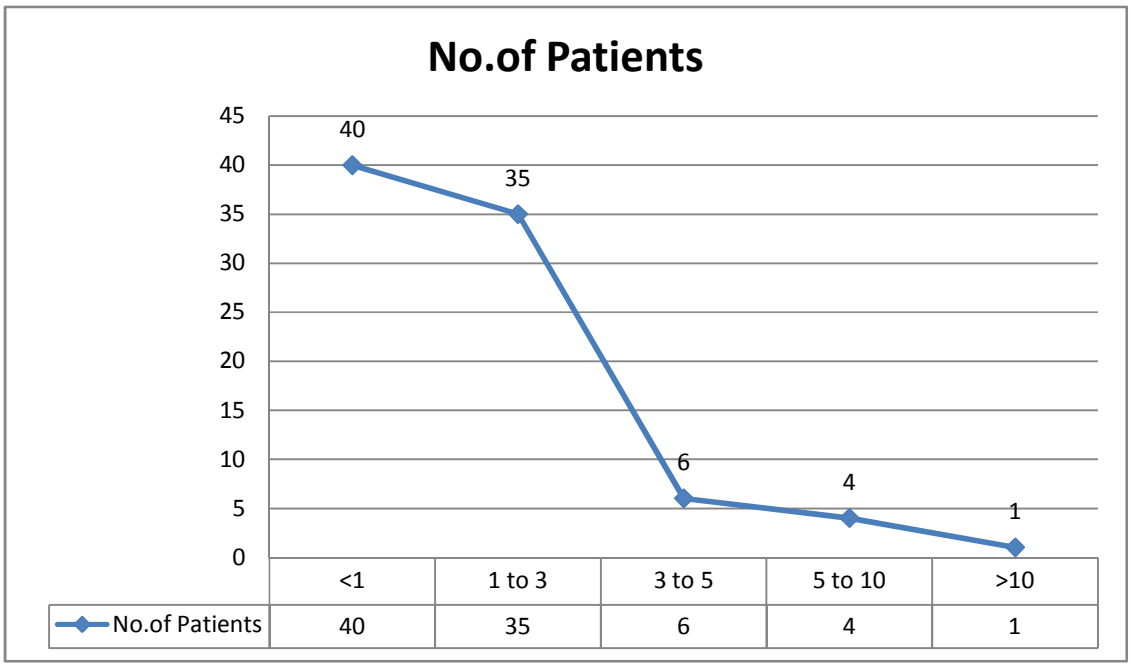
53% of patients were multipara among them 75% of patients had previous history of preeclampsia.35% (30 patients) were primi. 10 patients had bad obstetric history.

Most of the patients in our study were Multigravida (53%) and less than 25 years old. Similar results had been reported by American Academy of Physicians 2 and Chabra et al.

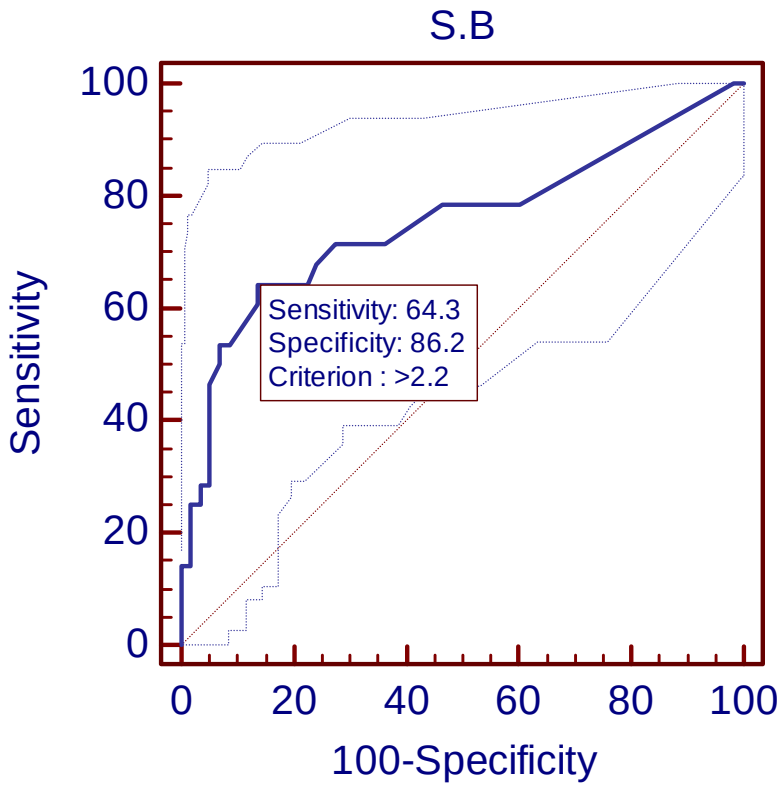


When comparing the total deaths with primi,multi and BOH it was found that 47% (13 patients) were primi, 21% (6 patients) were multipara and 32% (9 patients) had a bad obstetric history.

Comparison of Serum Bilirubin



We found that most of the patients had a serum bilirubin less than one (40 patients amo

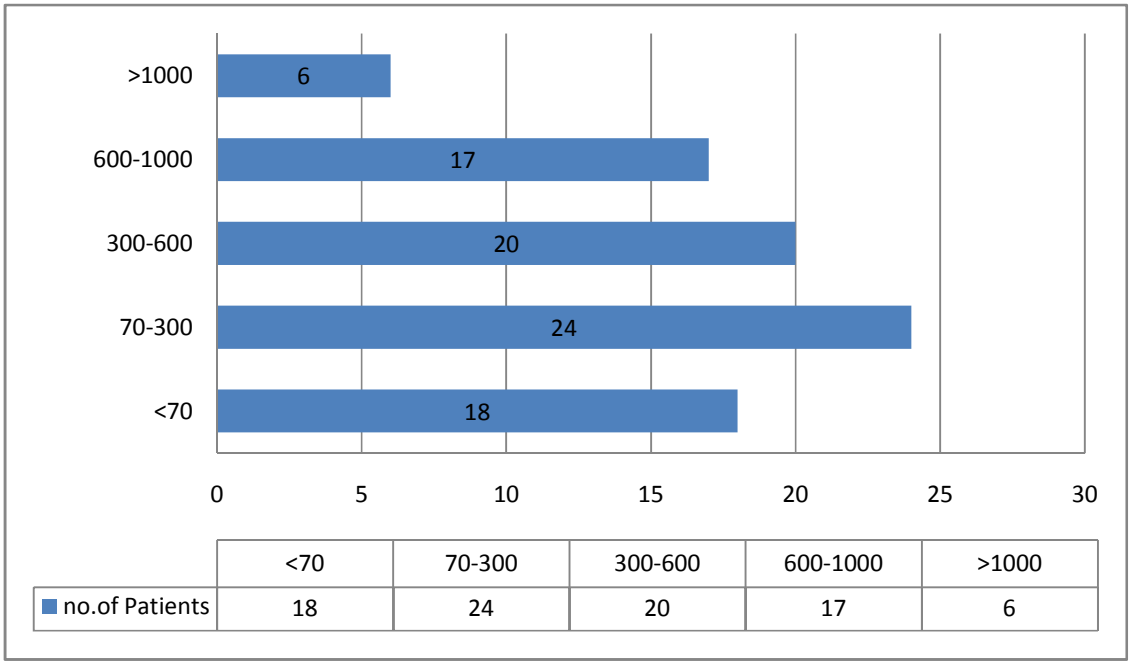


Variable	S.B
Classification variable	R_D R/D
Area under the ROC curve (AUC)	0.753079
Standard Errora	0.0627
95% Confidence intervalb	0.648309 to 0.839746
z statistic	4.034
Significance level P (Area=0.5)	0.0001

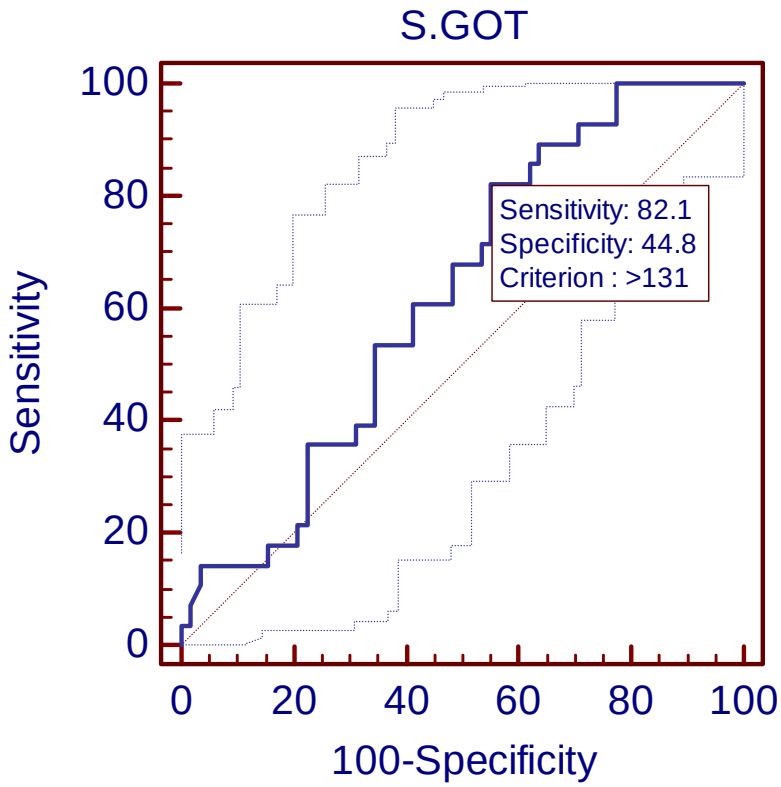
Significant association was foumd between serum bilirubin values and maternal death.

Values >2.2 is more associated with the incidence of maternal death.

COMPARISON OF SGOT



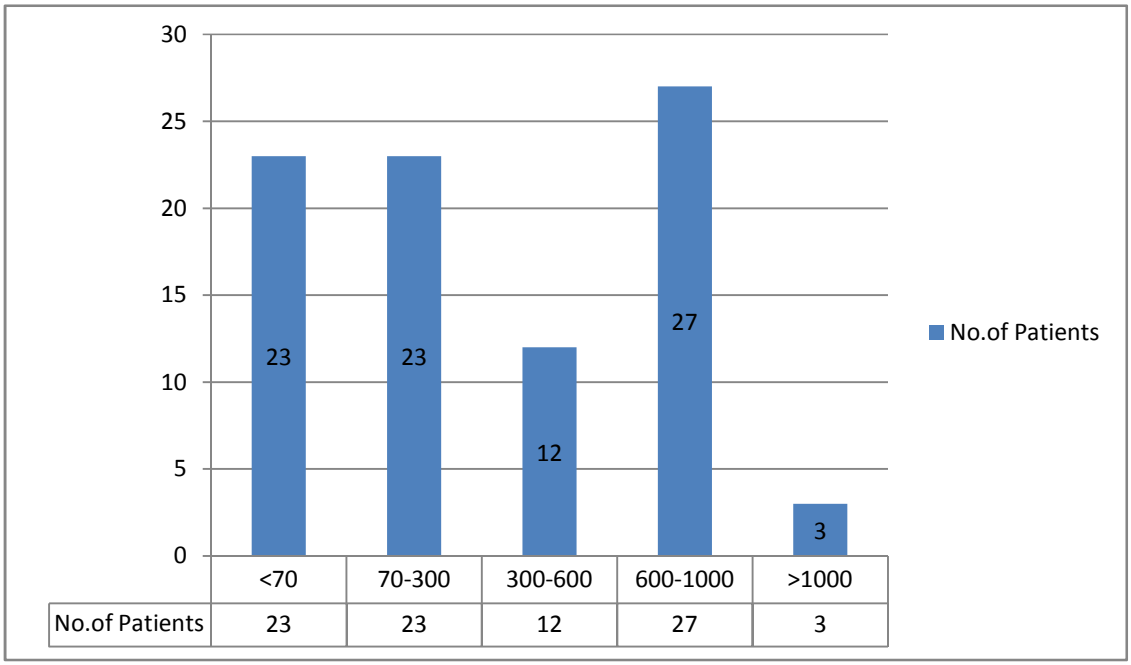
SGOT was found to be normal in 18 patients (21 %).



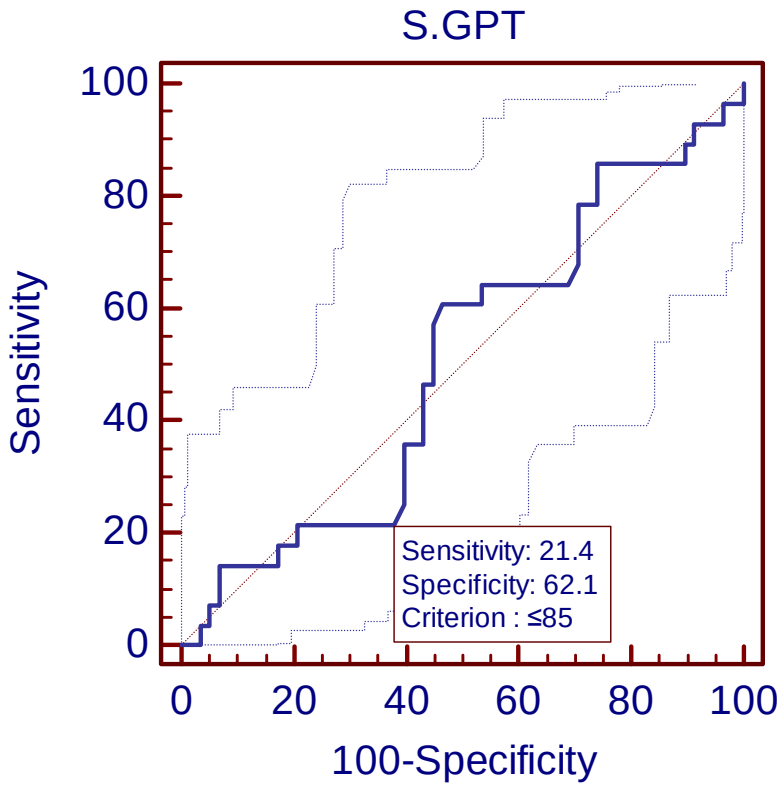
Variable	S.GOT
Classification variable	R_D R/D
Area under the ROC curve (AUC)	0.624076
Standard Errora	0.0610
95% Confidence interval	0.513061 to 0.726285
z statistic	2.034
Significance level P (Area=0.5)	0.0420

Sensitivity of association between SGOT and the incidence of maternal death was found to be 82.1%.

COMPARISON OF SGPT VALUES



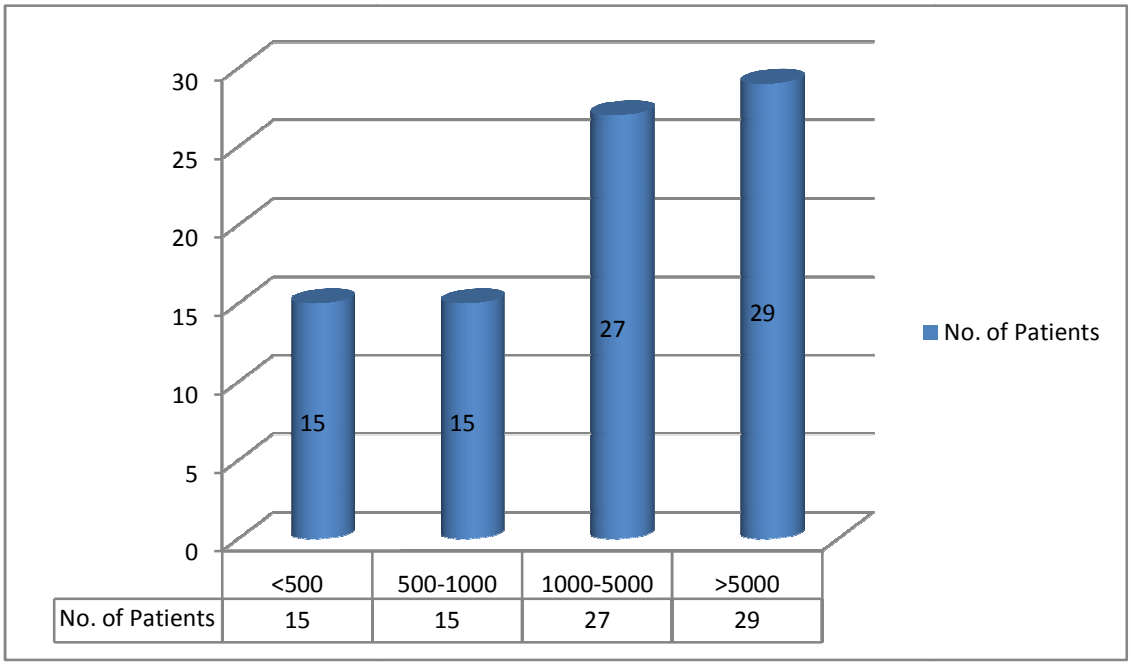
In 23 patients (27%) SGPT values were normal.



Variable	S.GPT
Classification variable	R_D R/D
Area under the ROC curve (AUC)	0.504002
Standard Errora	0.0670
95% Confidence intervalb	0.394042 to 0.613680
z statistic	0.0598
Significance level P (Area=0.5)	0.9524

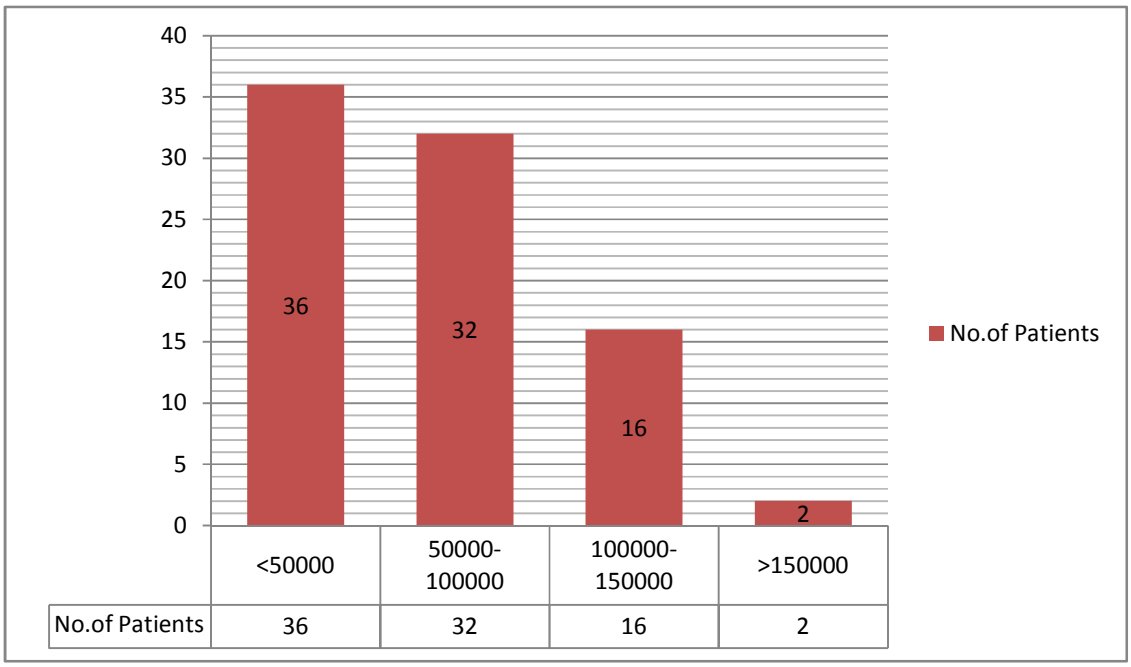
No significant association was found between the SGPT values and the incidence of maternal death. Sensitivity and specificity was very low

COMPARISON OF LDH VALUES

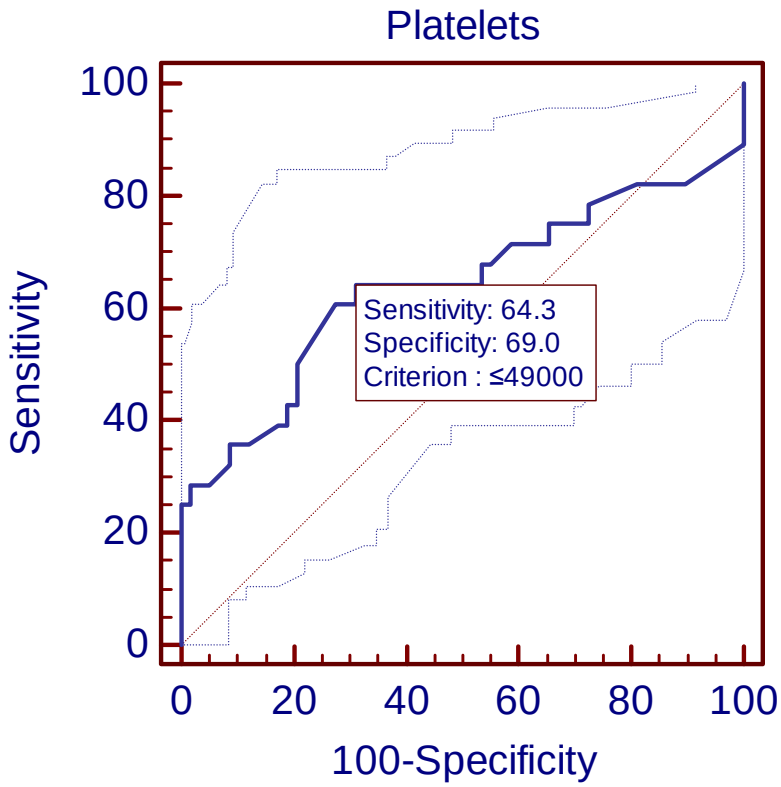


29 patients (33%)showed LDH values more than 5000 units depicting an increased hemolysis.

COMPARISON OF PLATELETS VALUES



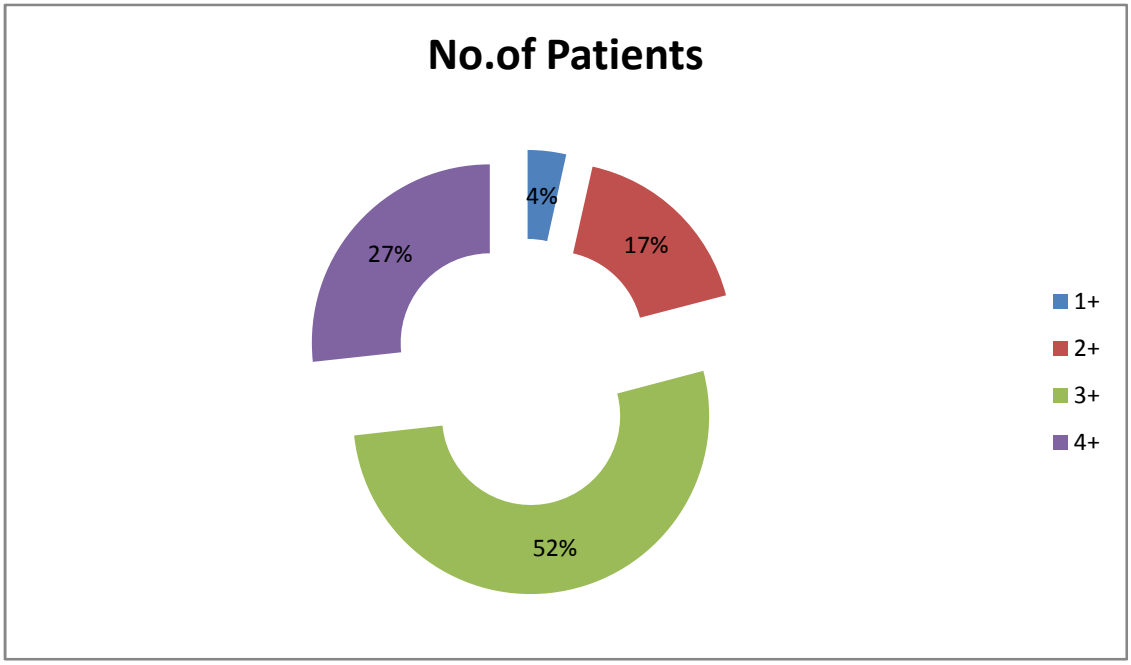
36 patients (41%) had a platelet count less than 50,000cells/cumm. 32 patients (37%) had a platelet count ranging 50,000-100000 cells cu.mm. 16 patients (19%) had a count ranging 100000-150000 cells cu.mm.



Variable	Platelets
Classification variable	R_D R/D
Area under the ROC curve (AUC)	0.639163
Standard Errora	0.0740
95% Confidence interval	0.528454 to 0.739989
z statistic	1.880
Significance level P (Area=0.5)	0.0601

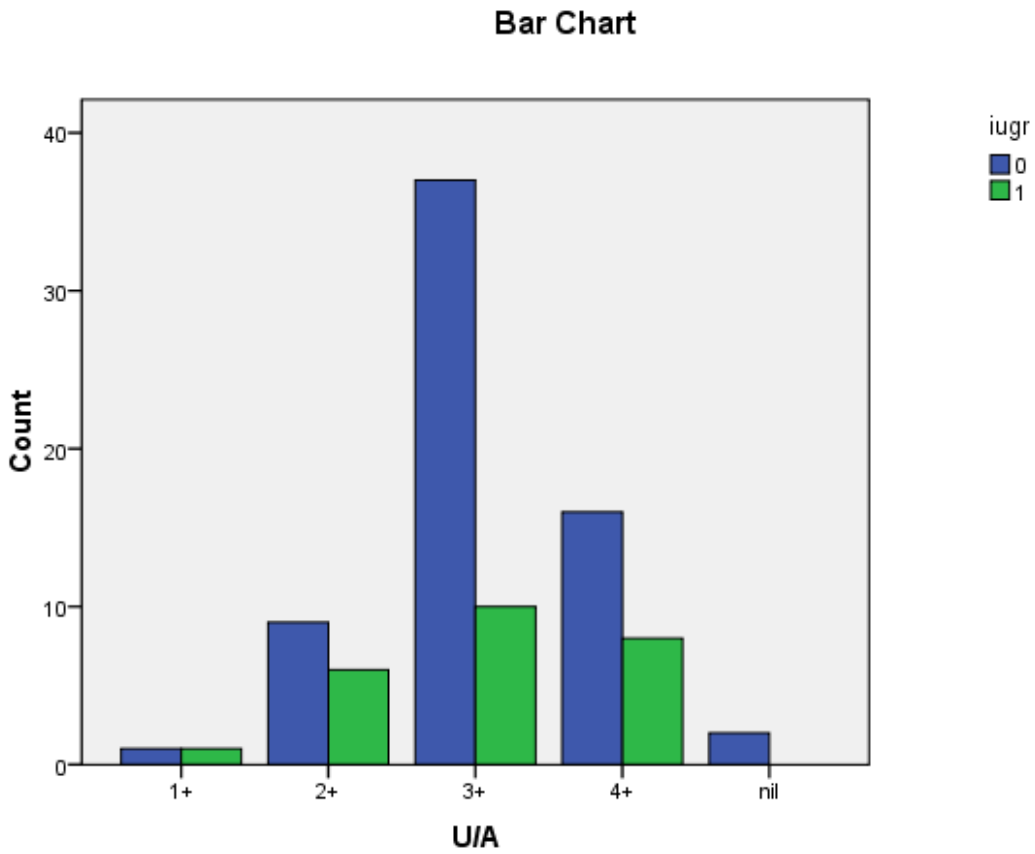
No significant association was found

Comparison of Urine Albumin



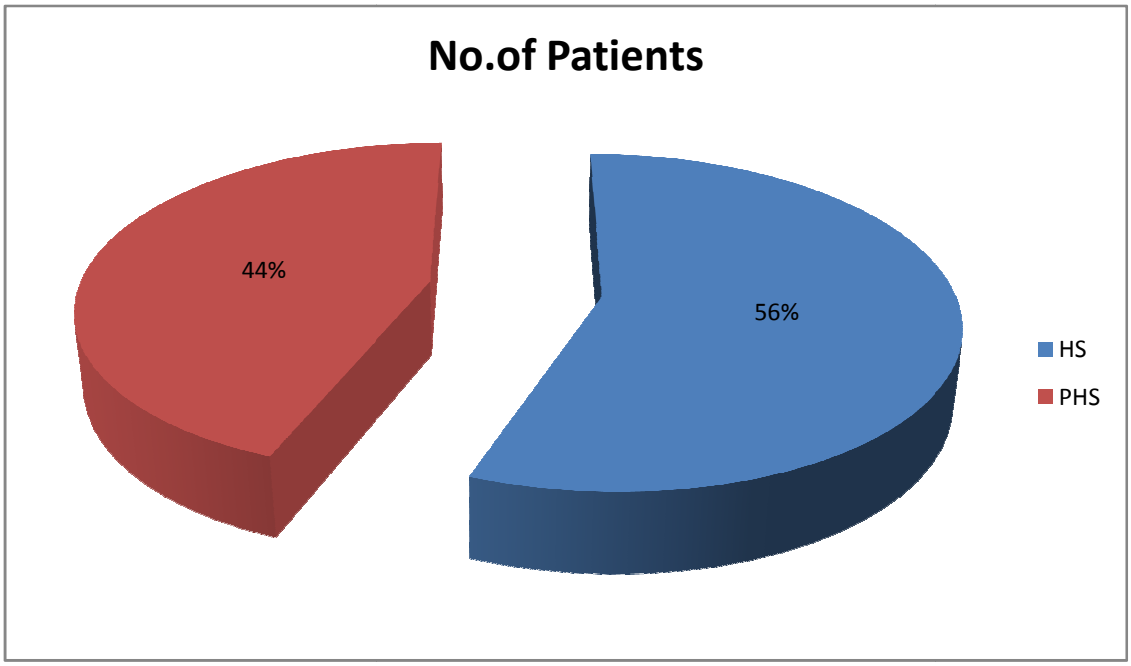
Urine Albumin	No.of Patients	Percentage
1+	3	4%
2+	15	17%
3+	45	52%
4+	23	27%

52% of patients showed a urine albumin of 3+. 27% of patients showed urine albumin of 4+.



This bar diagram shows the relationship between urine albumin with the incidence of IUGR. It is found that urine albumin of 3+ and 4+ are significantly associated with an increased incidence of IUGR.

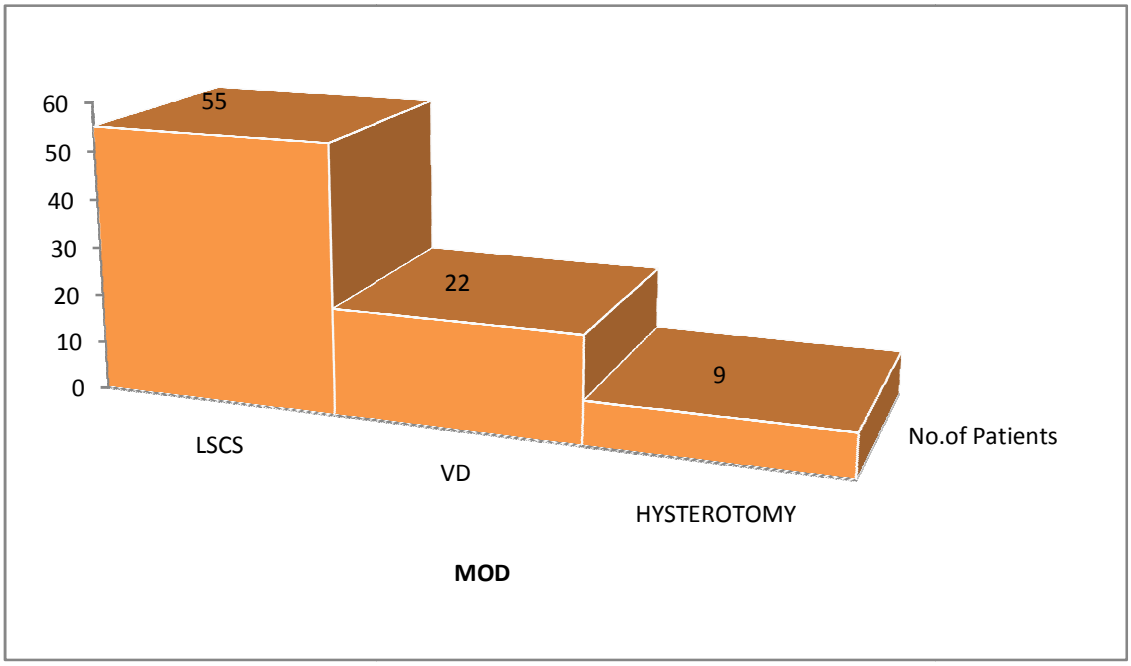
HELLP & PARTIAL HELLP SYNDROME



	No.of Patients	Percentage
HELLP Syndrome	48	56%
Partial HELLP Syndrome	38	44%

In our study 48 patients (56%) were under HELLP syndrome and the remaining 38 patients (44%) were under partial HELLP syndrome group.

Comparison of Mode Of Delivery

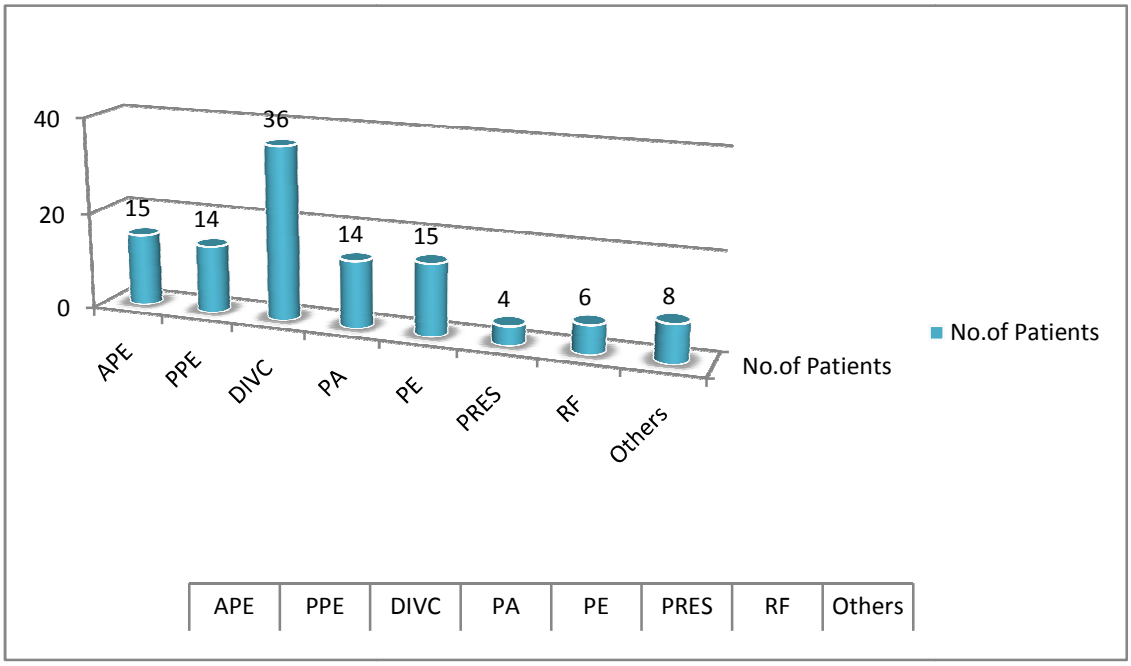


55 patients underwent LSCS (64%).

22 patients had a normal vaginal delivery (25%)

9 patients underwent hysterotomy (11%)

COMPARISON OF COMPLICATIONS



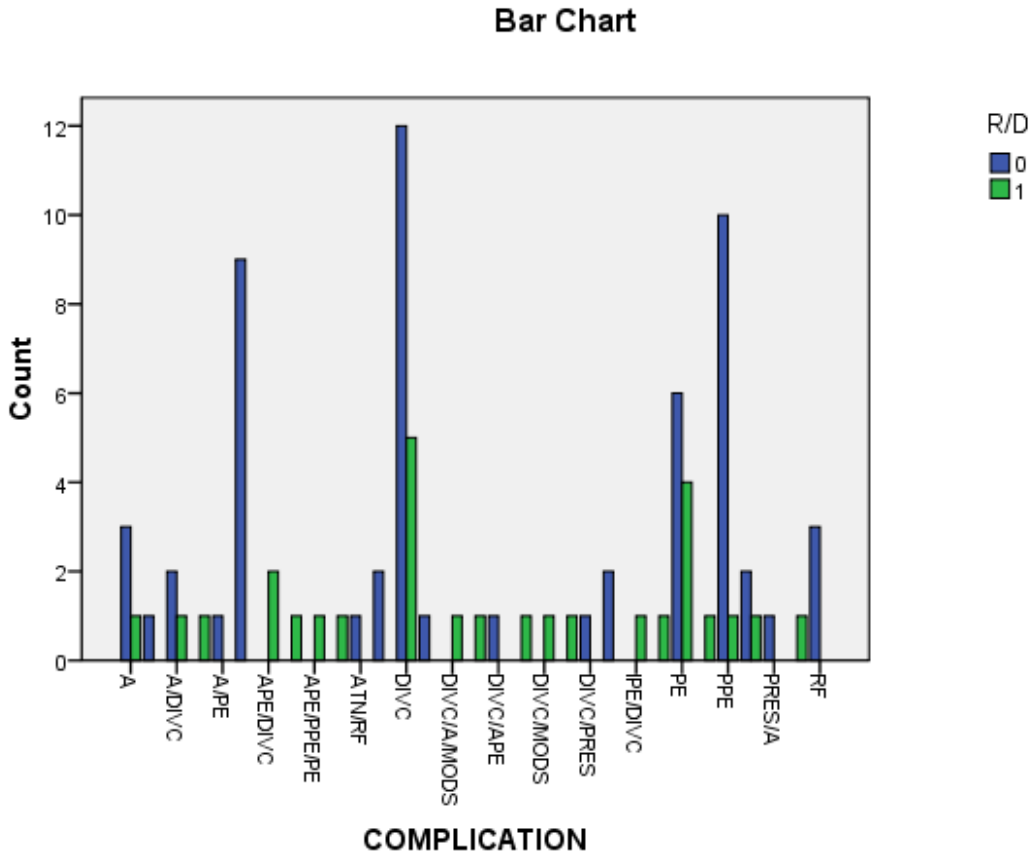
Disseminated intravascular coagulation was the most common complication. It was found in 36 patients (42%)

Antepartum eclampsia was found in 15 patients. Postpartum eclampsia was found in 14 patients.

Abruption was found in 14 patients, pulmonary edema in 15 patients

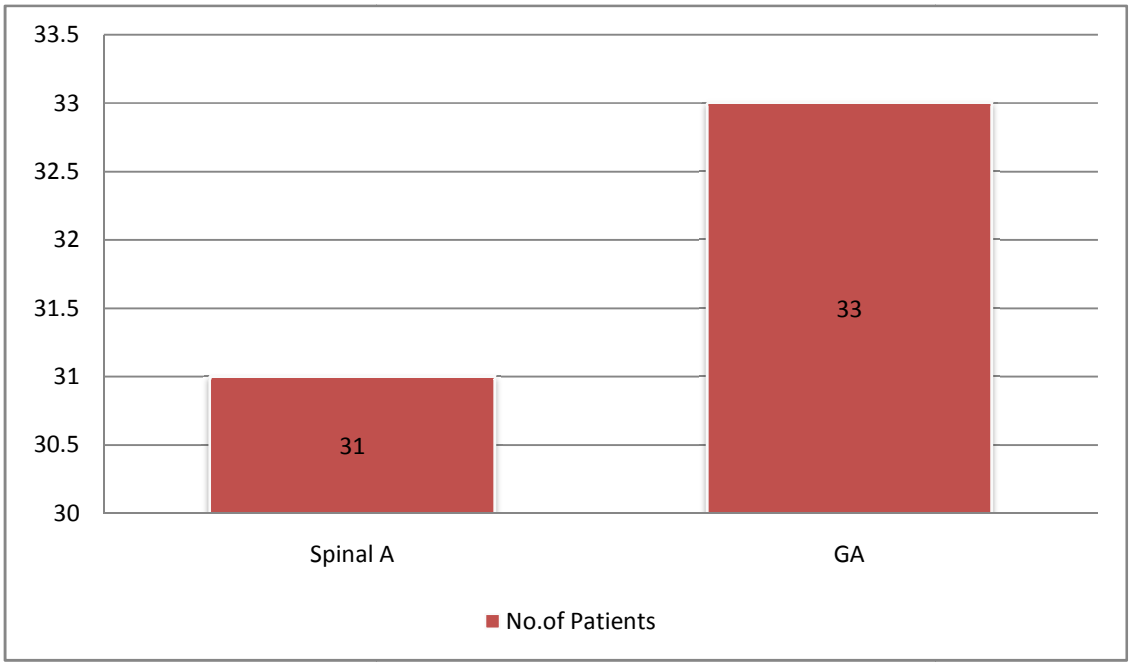
In comparing the complication with the maternal death it was found that patients with more than one complication was found to be in 14 patients among 28 deaths which is

50%. So patients with more than one complication had a significant association with the maternal death outcome.



This is tha bar diagram comparing the various maternal complications with mortality. It was found that DIVC and Pulmonary edema was significantly associated with increased incidence of maternal death.

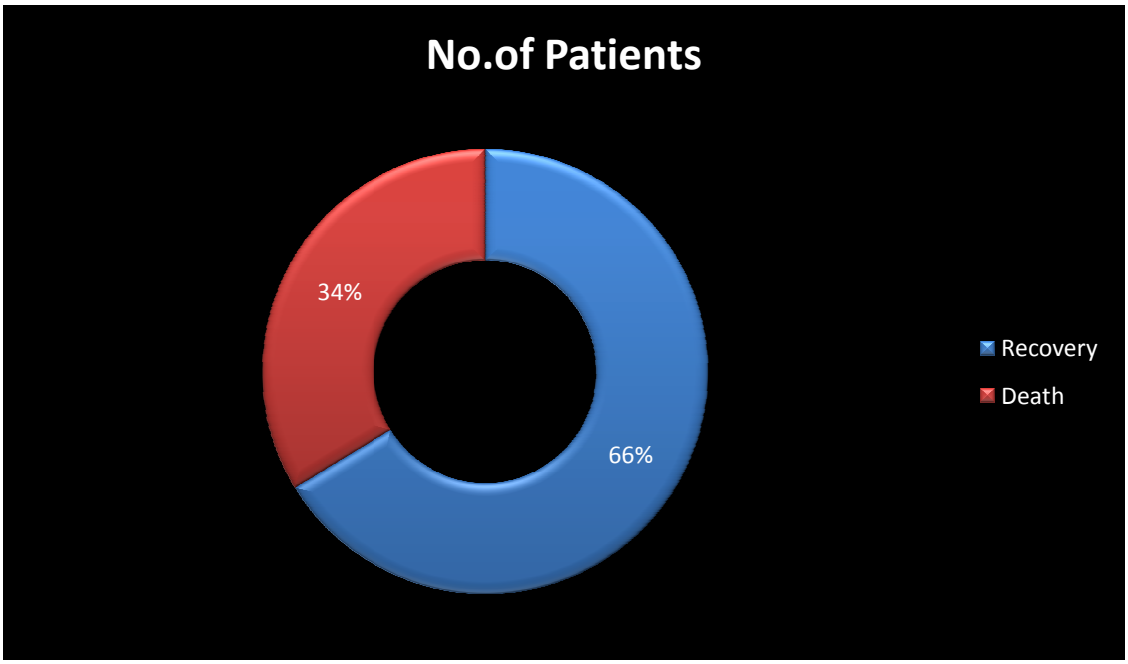
Comparison of Type of Anaesthesia



Among the patients who underwent surgery 33 patients had a general anaesthesia and 31 patients in spinal anaesthesia.

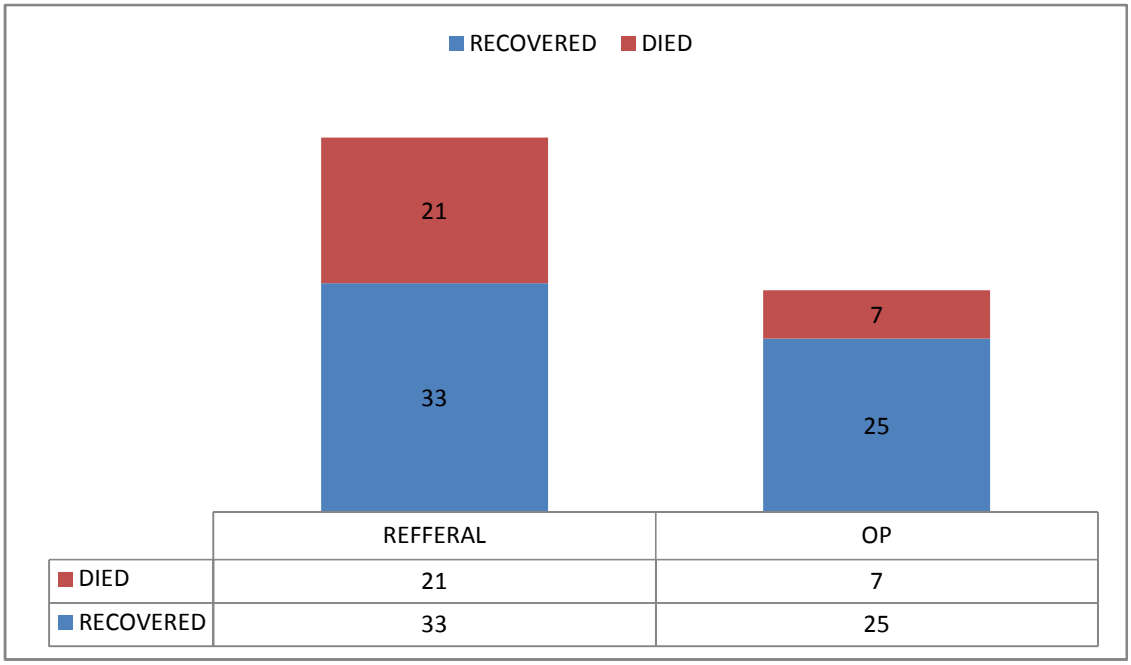
Spinal anaesthesia was mostly given in patients who delivered prior to the development of HELLP syndrome

Comparison of Recovery & Death



Death percentage in our study was found to be 34% (28 patients)

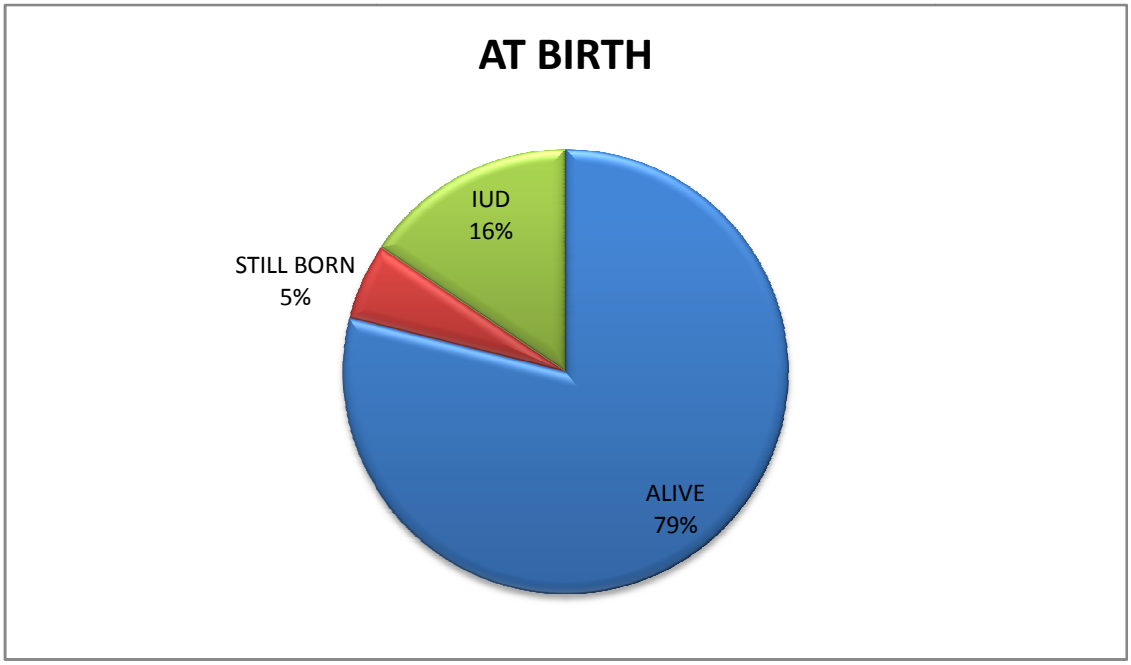
MATERNAL OUTCOME IN REFERRAL & OP CASES



	REFFERAL	OP
DIED	21	7
RECOVERED	33	25

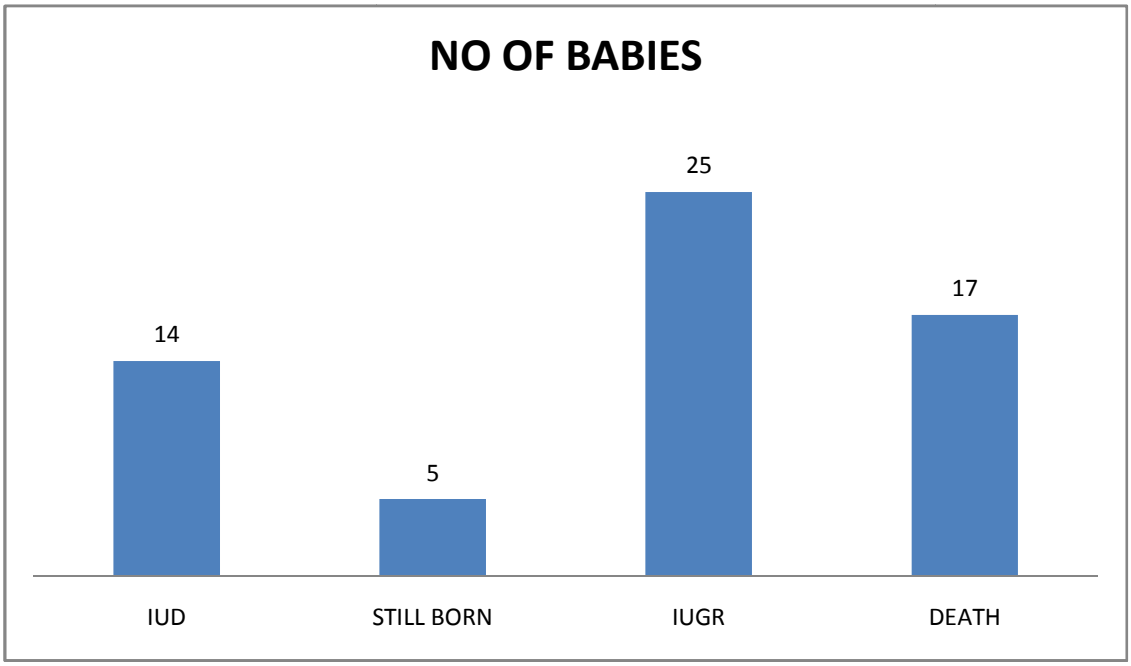
This bar diagram represents the comparison of referral patients and OPD patients in the maternal outcome. It was found that among the 54 referral patients 21 patients had maternal deaths (39%). Of the 32 OPD patients 7 died (22%).

BABY OUTCOME AT BIRTH



ALIVE	71 BABIES
STILL BORN	5 BABIES
IUD	14 BABIES

BIRTH COMPLICATIONS

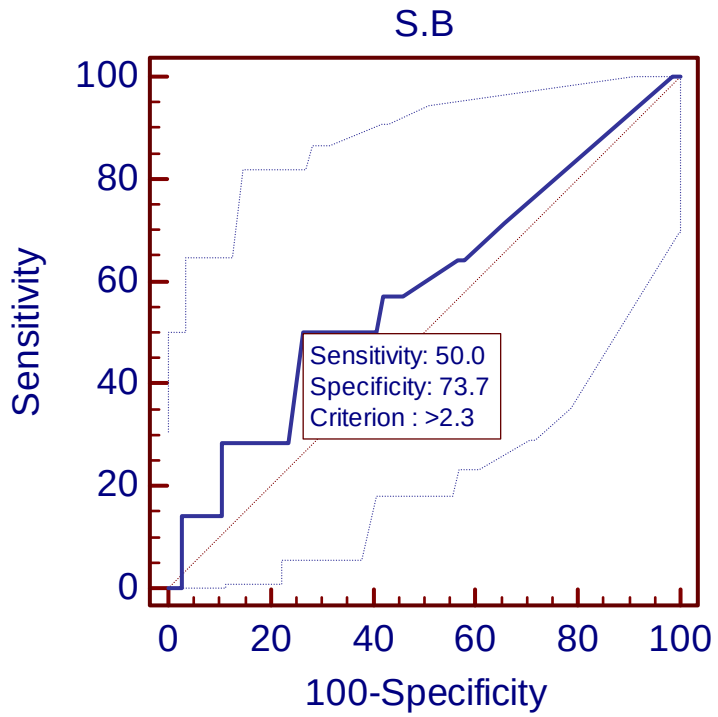


IUD was found in 14 babies

Still born accounted for in 5 babies

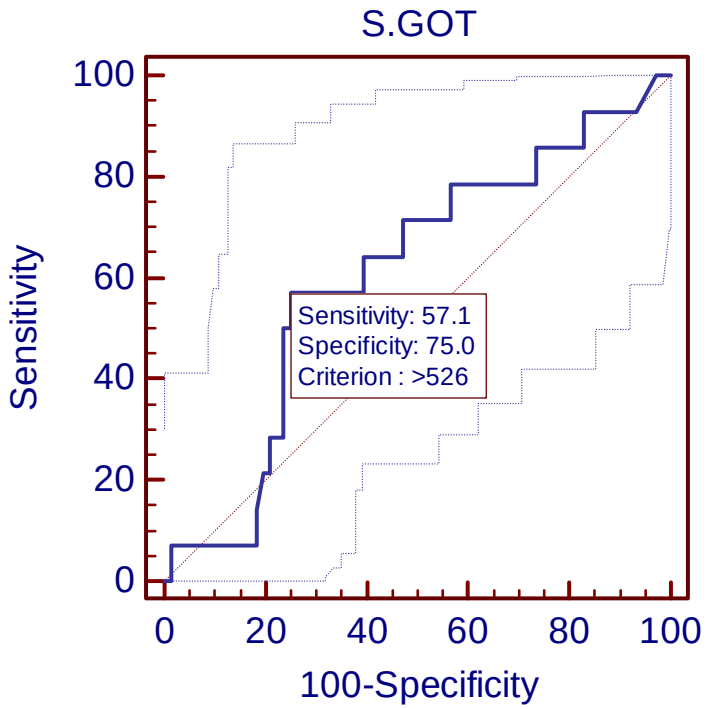
IUGR was found to be the most common complication in 25 babies

17 babies died.



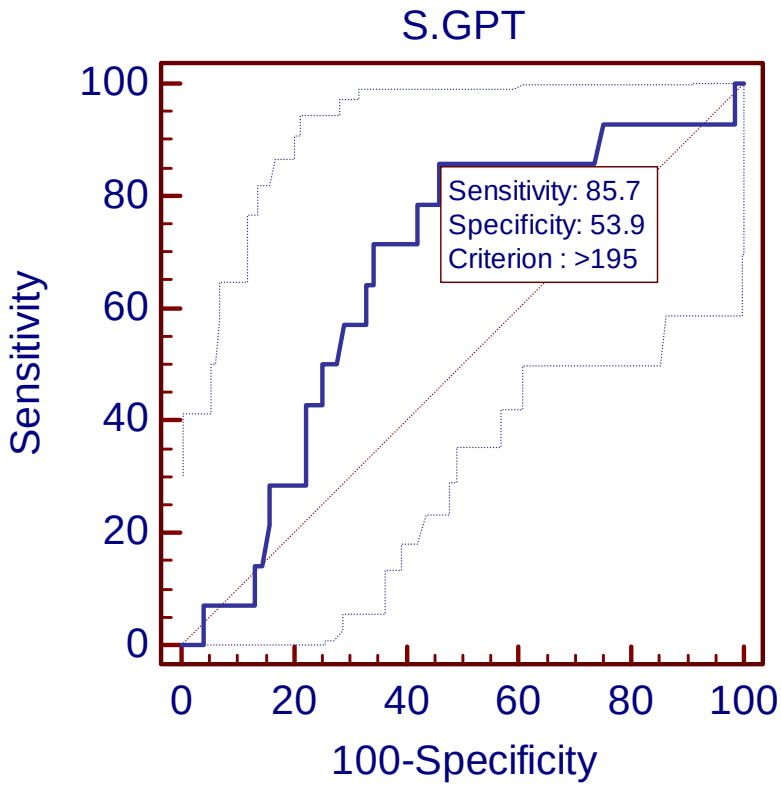
Area under the ROC curve (AUC)	0.582237
Standard Error[a]	0.0893
95% Confidence interval[b]	0.473519 to 0.685387
z statistic	0.921
Significance level P (Area=0.5)	0.3568

This ROC curve depicts that serum bilirubin level of above 2.3mg/dl there is a more incidence of IUD.



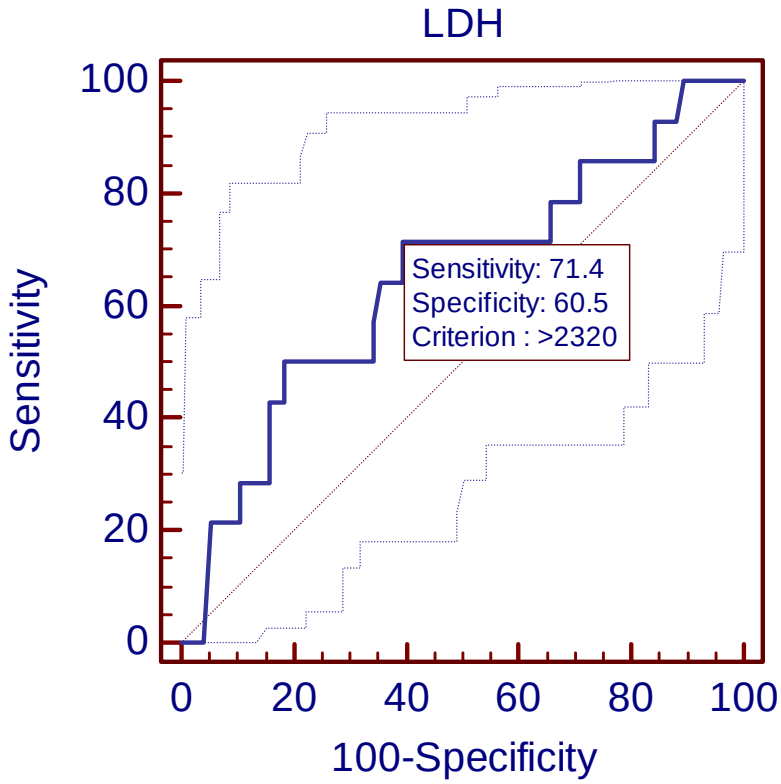
Area under the ROC curve (AUC)	0.606203
Standard Error[a]	0.0826
95% Confidence interval[b]	0.497596 to 0.707616
z statistic	1.285
Significance level P (Area=0.5)	0.1987

This ROC curve depicts the SGOT pattern with the incidence of IUD.SGOT values were found not significantly associated with IUD.



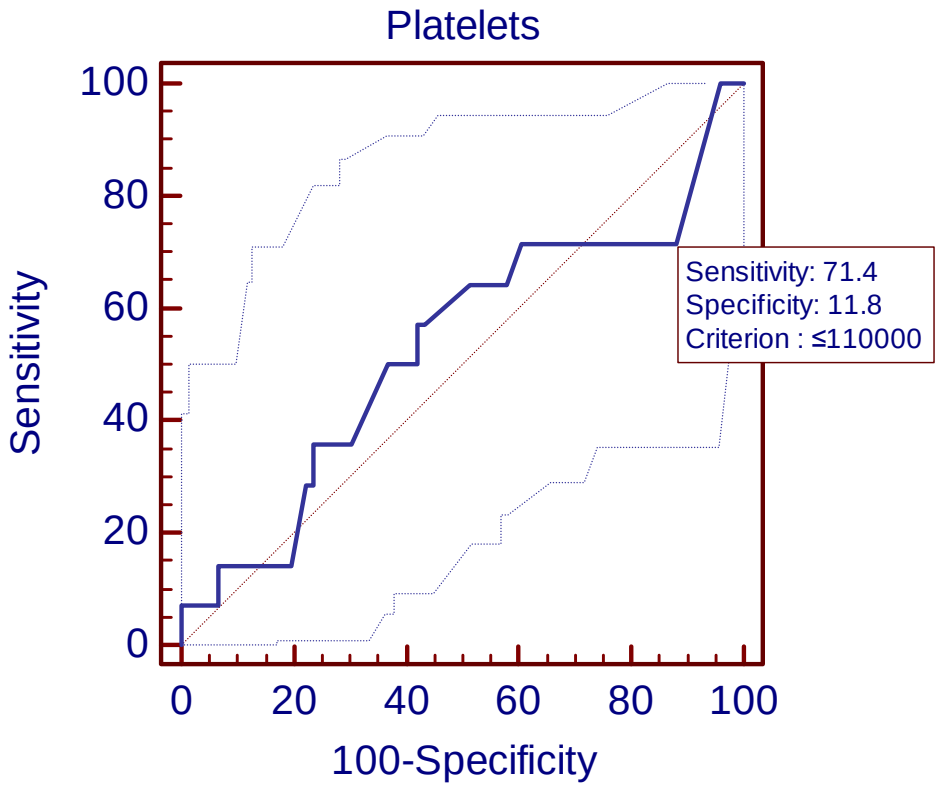
Area under the ROC curve (AUC)	0.661184
Standard Error[a]	0.0771
95% Confidence interval[b]	0.553774 to 0.757655
z statistic	2.090
Significance level P (Area=0.5)	0.0366

This ROC curve depicts the SGPT pattern with the incidence of IUD. SGPT values were found not significantly associated with IUD.



Variable	LDH
Classification variable	Iud
Area under the ROC curve (AUC)	0.648026
Standard Errora	0.0865
95% Confidence interval	0.540206 to 0.745805
z statistic	1.712
Significance level P (Area=0.5)	0.0869

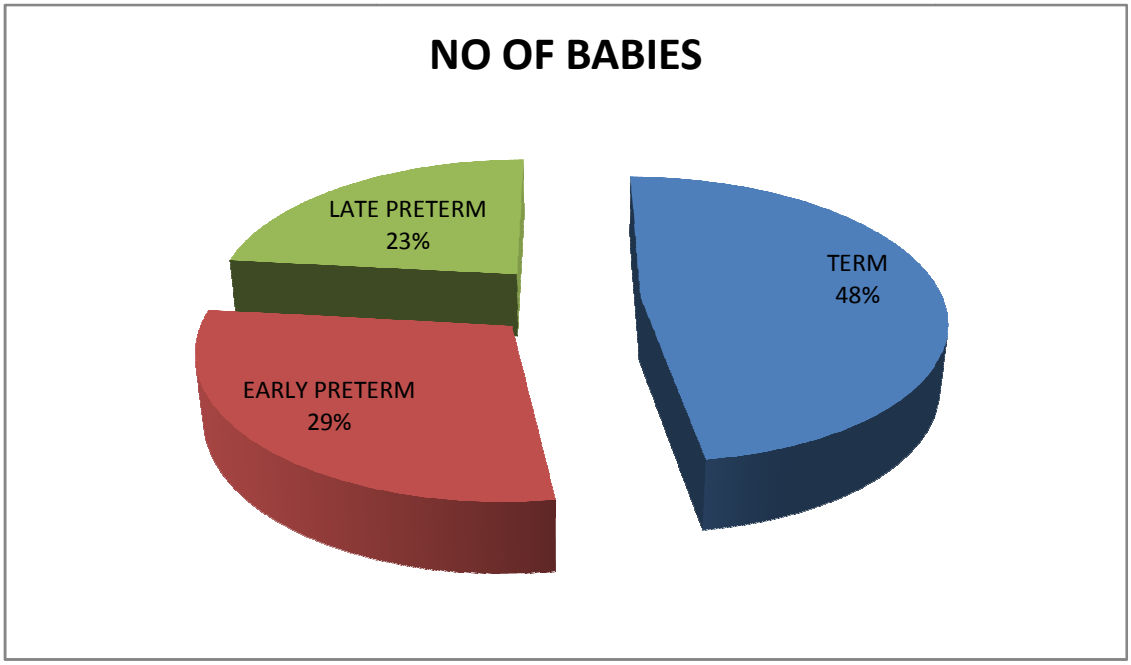
ROC curve was plotted. Sensitivity of 71.4% was found which had an significant association with IUD. It was found that LDH value of more than **2320** was found to be more significantly associated with incidence of IUD



Variable	Platelets
Classification variable	iud
Area under the ROC curve (AUC)	0.531015
Standard Errora	0.0939
95% Confidence intervalb	0.422858 to 0.637074
z statistic	0.330
Significance level P (Area=0.5)	0.7413

This is the ROC curve comparing the platelets values with the incidence of IUD. No significant association was found.

COMPARISON OF BABY MATURITY

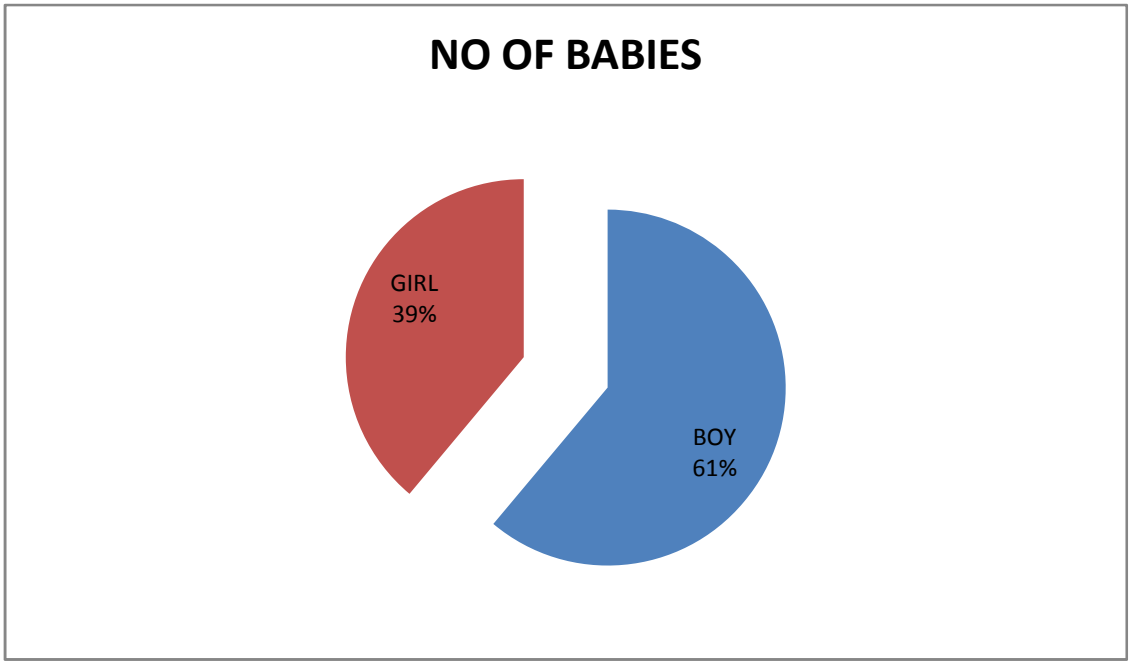


48% of babies were term babies

29% of babies were in early preterm

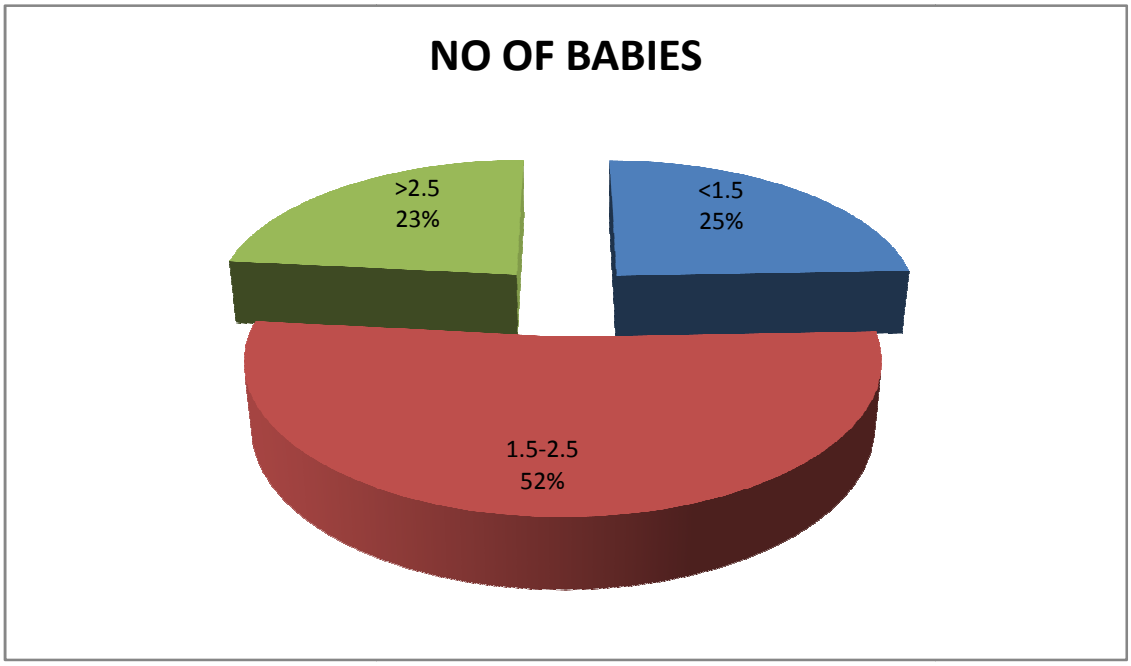
23% of babies were in late preterm

COMPARISION OF SEX OF THE BABY

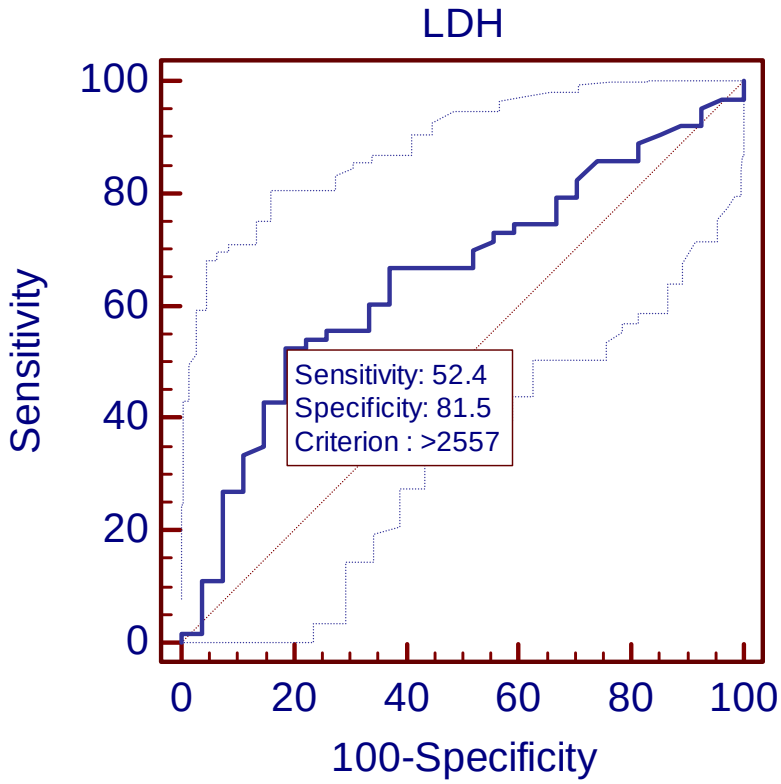


SEX OF BABY	NO OF BABIES
BOY	55
GIRL	35

COMPARISON OF BIRTH WEIGHT



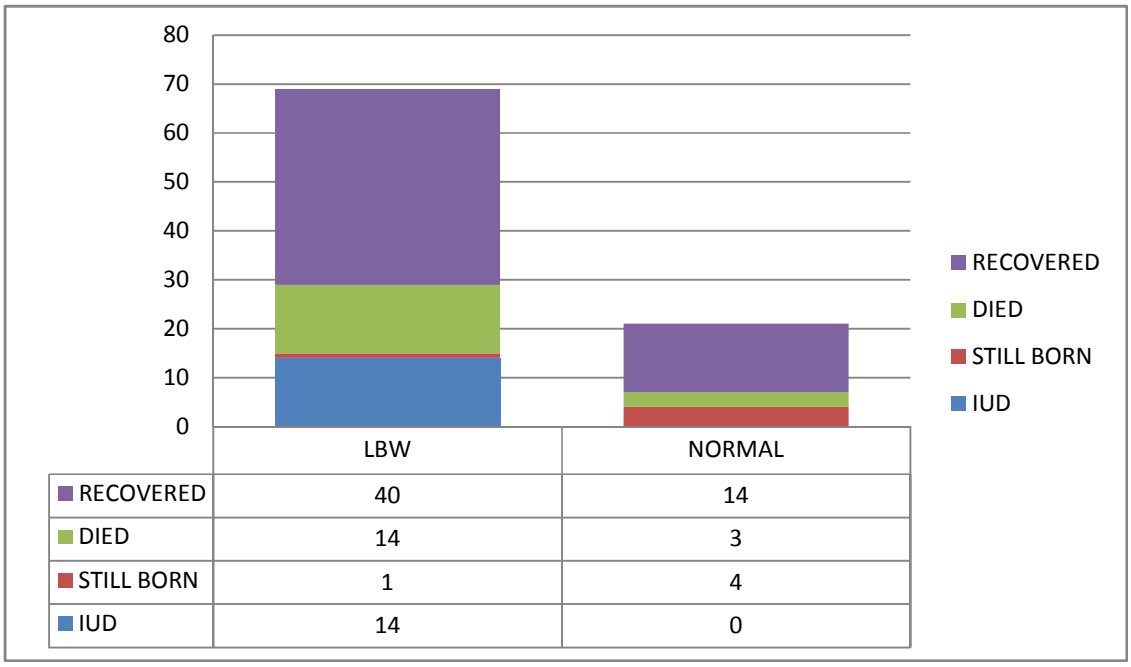
BIRTH WEIGHT IN KG	NO OF BABIES
<1.5	22
1.5-2.5	47
>2.5	21



Area under the ROC curve (AUC)	0.649912
Standard Error[a]	0.0617
95% Confidence interval[b]	0.542145 to 0.747508
z statistic	2.429
Significance level P (Area=0.5)	0.0151

A correlation was found between LDH values and birth weight. Values of LDH above 2557 was found to be significantly associated with the higher incidence of LBW.

COMPARISION OF BIRTH WEIGHT WITH THE FETAL OUTCOME

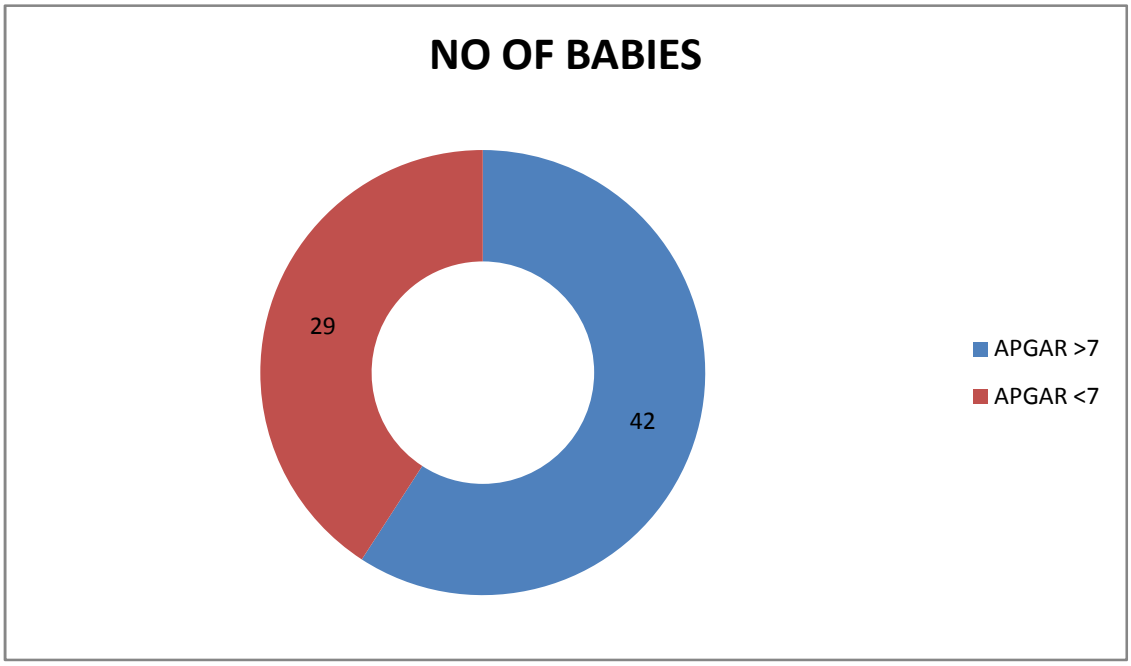


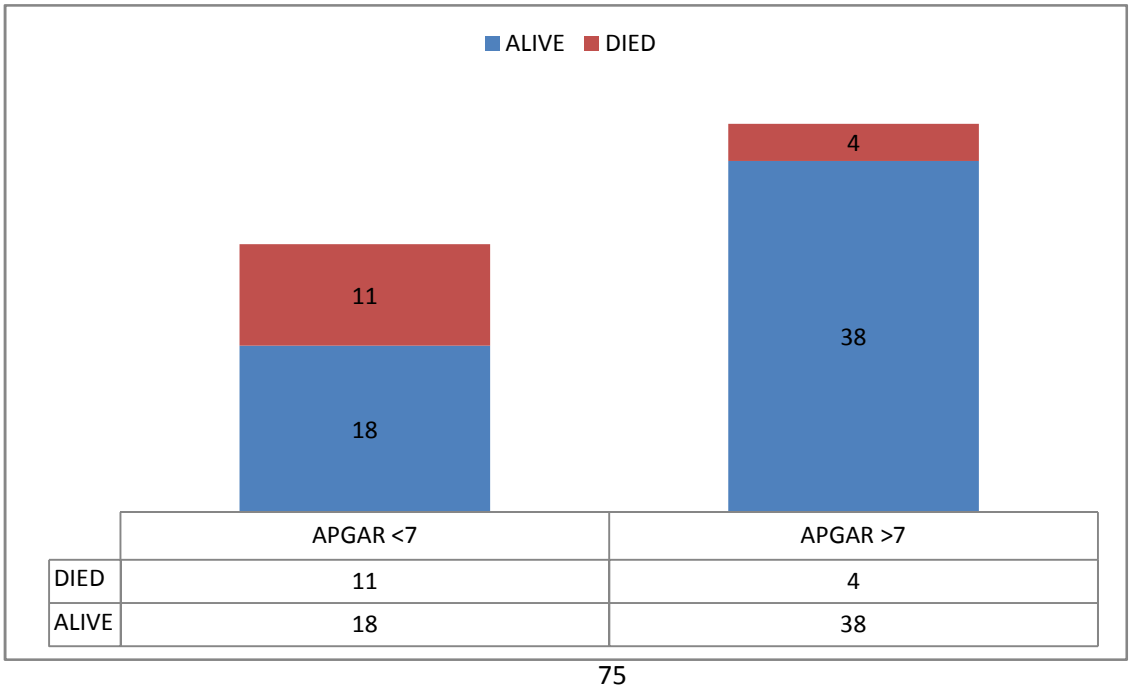
	LBW	NORMAL
RECOVERED	40	14
DIED	14	3
STILL BORN	1	4
IUD	14	0

It was found that 14 babies of low birth weight died in comparison of 3 babies of normal weight had a worst fetal outcome (fetal death).

Similarly intra uterine deaths were also high among the low birth weight babies.

BABY OUTCOME IN RELATION WITH APGAR SCORE





	APGAR <7	APGAR >7
DIED	11	4
ALIVE	18	38

TABLE: CHARACTERISTICS OF HELLP SYNDROME AND PARTIAL HELLP SYNDROME

	HELLP SYNDROME (N=48)	**PARTIAL HELLP (N=38)**
MODE OF DELIVERY		
LSCS	31 (64.58%)	24 (63.15%)
VD	9 (18.75%)	13 (34.21%)
HYESTEROTOMY	8 (16.66%)	1 (2.63%)
INDUCED		
TYPE OF ANAESTHESIA (N=64)		
SPINAL	15 (31.25%)	16 (42.10%)
GA	24 (50%)	9 (23.68%)
PERINATAL OUTCOME(90)		
BW (LBW)	39(43%)	23(25%)
APGAR SCORE (at 5 min<7)	19(21%)	9(10%)
IUD	10(11%)	4(4.4%)
IUGR	13(14.4%)	12(13.3%)
NEONATAL DEATH	10(11.1%)	5(5.5%)
STILL BORN	3(3.3%)	2(2.2%)
MATERNAL OUTCOME		
APE	9 (18.75%)	6 (15.78%)
PPE	6 (12.5%)	8 (21.05%)
DIVC	23 (47.91%)	13 (34.21%)
PLACENTAL ABRUPTION	9 (18.75%)	5 (13.15%)
PE	8 (16.66%)	7 (18.42%)
PRES	2 (4.16%)	2 (5.26%)
RENAL FAILURE	3 (6.25%)	3 (7.89%)
OTHERS	5 (10.41%)	3 (7.89%)

Table reveals the characteristics of HELLP syndrome and partial HELLP syndrome, according to mode of delivery, type of anaesthesia, perinatal and maternal outcome. Majority of patients in the two groups underwent caesarean section.

Emergency caesarean sections outnumbered elective cases in both the groups .But the rate of emergency and elective caesarean section did not differ significantly among the groups. Spontaneous vaginal delivery rates were significantly different among them. However, spontaneous vaginal delivery rates were less than induced ones in all of the patients.

The cesarean section rate in HELLP and partial HELLP syndrome were very high in our study as the pregnancy was terminated as soon as the disease was diagnosed to avoid worsening of maternal and perinatal outcomes. Such decisions resulted in increased cesarean section rates and preterm delivery. According to Ching Ming Lui et al the overall cesarean delivery rate was 83.3%, and 89.1% in complete HELLP syndrome and partial HELLP syndrome respectively. Joelcio Fransisco Abbade et al proved in their study that the overall caesarean section delivery rate was significantly higher in the Partial HELLP syndrome group (70.7%).

Patients with HELLP syndrome mostly underwent general anaesthesia during caesarean section. Rate of spinal anaesthesia were significantly less in HELLP syndrome (31.25), partial HELLP syndrome (42.10%).

Incidence of LBW was significantly increased in HELLP when compared to partial HELLP syndrome. All the perinatal morbidity and mortality is found to be more in in HELLP syndrome than in partial HELLP syndrome. So early intervention during partial HELLP syndrome can reduce the morbidity and mortality than delaying and progressing to HELLP syndrome.

The range of maternal complications in our study included eclampsia, renal failure (ARF), placental abruption, disseminated intravascular coagulation (DIVC) and maternal mortality. Eclampsia was increased significantly in HELLP syndrome (18.75%) than in partial HELLP syndrome (15.78%). The complications were distributed in the antepartum and postpartum period in both HELLP and partial HELLP syndrome groups

The rate of eclampsia in HELLP syndrome group and partial HELLP syndrome group were significantly higher as shown in our study, was well supported by the study of Ching Ming Liu et al .

The Government of Tamilnadu has strengthened the health system by providing increased staff strength in PHC levels, providing laboratory facilities and the 108 ambulance referral system.

Our study calculated the prevalence of HELLP syndrome as (2.6%) while the prevalence of partial HELLP (2.08%)syndrome came out as. Ching Ming Liu et al found that complete HELLP syndrome occurred in 2.3% of cases, partial HELLP syndrome in 17.4% of cases.

Antenatal mothers should have proper BP checkups and weight measurements during their regular visits at primary level care. If there is an increase in BP levels and urine albumin positive, sudden gain in weight, pedal edema. Patient should have promptly be done the minimal blood investigations like haemoglobin, platelets count, urine albumin and peripheral smear, serum bilirubin.

If the antenatal mother has any other non specific symptoms such as sunken eyes, pedal edema, then investigations should be made mandatory. If possible LDH,SGOT,SGPT should be done.

From the study it is seen that LDH >2354 and serum bilirubin >2.3 has an increased incidence of maternal death. Hence if both of these are elevated even mildly more than the normal level, patients should be referred directly to the tertiary care level immediately avoiding the 2nd and 3rd referrals. The early diagnosis and early referral gives time for management which can prevent maternal deaths to a great extent.

Most of the deaths are due to underdiagnosis and delayed diagnosis and patients being referred during late stages when the patients develop complete HELLP syndrome where there is more morbidity and mortality.

In our study there were 54 referrals and death among them was 21 patients. With early diagnosis and early referral this could have been prevented.

Proper education of the health personnel about the signs and symptoms, proper routine antenatal check up and warning signs and symptoms and laboratory investigations can be much helpful to make an early diagnosis and management and thus preventing and decreasing the incidence of maternal deaths.

CONCLUSION

During the study period July 2013 to June 2015, there was about 75 cases of maternal death. Of which 28 cases were due to HELLP Syndrome. This contributes to 1/3rd of the total maternal deaths. Among the 86 patients of HELLP syndrome 54 were referred from other hospitals in which IOG was found to be 3rd or 4th referral centre.

1. Our study calculated the prevalence of HELLP syndrome as (2.6%) while the prevalence of partial HELLP as (2.08%).
2. Significant association was found between serum bilirubin values and maternal death. Values >2.2 is more associated with the higher incidence of maternal death.
3. Sensitivity of association between SGOT and the incidence of maternal death was found to be 82.1%.
4. Serum bilirubin level of above 2.3mg/dl is associated with a higher incidence of IUD.
5. It was found that LDH value of more than **2320** was significantly associated with higher incidence of IUD.
6. Most of the patients in our study were Multigravida (53%) and less than 25 years old.

7. Values of LDH above 2557 was found to be significantly associated with the higher incidence of LBW.
8. The cesarean section rate in HELLP and partial HELLP syndrome were very high in our study as the pregnancy was terminated as soon as the disease was diagnosed to avoid worsening of maternal and perinatal outcomes.
9. Placental abruption corroborated with the bad perinatal prognosis in both HELLP and partial HELLP syndrome.
10. In our study DIVC was found to be most common complication.
11. The rate of eclampsia in HELLP syndrome group and partial HELLP syndrome group were significantly higher as shown in our study

BIBLIOGRAPHY

BIBLIOGRAPHY

1. GoncaAyse IMIR, OZDEMIR KOL, Kenan KAYGUSUZ, et al . Perinatal outcome in HELLP syndrome Journal Turkish German Association Vol. 9(2) 2008.

2. Christy M Isler, MD, Brian K. Rinehart, MD, et al. Maternal mortality associated with HELLP (hemolysis elevated liver enzymes and low platelets) syndrome. American Journal of Obstetrics and gynecol 1999 Vol. 181.No.4. 924-27.

3. ShafikaBanoo, Tanuja Amin Makhdoomi, Shahida Mir, Javid A Malik. Incidence of HELLP syndrome in severe pregnancy induced hypertensionandits impact on maternal and fetal outcome. JK Practioner Vol. 14. No. 2 April –June 2007.

4. James and Martin, Jr., MD, Pamela G. Blake, et al . The natural history of HELLP pattern of disease progression **and** regression. Am. Journal of obstetrics and Gynecol 1991. 164.No.6:1500-1513.

5. Sibai BM, Barton JR, Dexamethasone to **improve** maternal outcome in women with hemolysis, elevated liver enzymes and low platelets syndrome.

American Journal of Obstetrics and Gynecol 2005.193:1587-90.

6. Chames MC, Haddad B Barton JR et al., Subsequent pregnancy outcome iswomen with a history of HELLP syndrome at 28% weeks of gestation. AmJournal of Obstetrics and Gynecol 2003:188:1504-07.

7. Kaur Amrit Pal, Saini A.S., Dhillon S.P.S, HELLP syndrome associated with moderate to severe preeclampsia - eclampsia. Journal of Obstetrics &Gynecol India Vol 53, No. 2 March - April 2003, 165-169.

8. Hypertensive disorder in pregnancy edition Cunningham F G Leveno, KJ bloom LS Gilshap L editors, Williams text book of obstetrics

9. High risk pregnancy James Steer, Weiner, Gonik 3rd Edition.

10. Everett and Magann and James N martin, twelve steps to optimal management of HELL syndrome clinical obstetrics and gynecology Vol 42, No. 3 , Page 532- 550.

11. Robert S Egerman and Baha M Sibai, Clinical Obstetrics and Gynaecology Vol 42. No. 2 Page 381-389.

12. Javier E Fonseca, MD, MSc , Fabian Mendez, MD, PhD, et al Dexamethasone treatment does not improve the outcome of women with HELLP syndrome; A double-blind, placebo-controlled, randomised clinical trial

PROFORMA

Proforma

Maternal parameters

- Name
- Age
- IP no
- Obstetric code
- Weeks of gestation
- Hemoglobin
- Serum bilirubin
- Serum aspartate transaminase
- Serum alanine transaminase
- Lactate dehydrogenase
- Platelets
- Mode of delivery
- Complications
- Recovery/death

Fetal parameters

- Sex
- Maturity
- Birth
- weight
- Apgar>7
- Complications
- Baby outcome

MASTER CHART

MATERNAL OUTCOME IN HELLP SYNDROME

S.No	Name	Age	I.P no	OBS CODE	WOG	HB %	S.B	S.GOT	S.GPT	LDH	Platelets	U/A	MOD	COMPLICATION	R/D
1	Revathy	25	32297	PRI/TWIN	37+6	10.2	2.8	1359	885	2567	43000	nil	LSCS	DIVC	D
2	Anitha	29	31201	G2A1	38+2	11.5	0.8	415	195	380	150000	1+	LN	DIVC/AFE	D
3	Mala	28	32385	G2P1L1	34+5	13.1	4.1	1063	719	6426	32000	3+	LSCS	APE/DIVC	D
4	Saranya	27	28589	PRIMI	33+6	15.2	1.3	257	118	184	220000	3+	LSCS	PE	D
5	Amara	27	23567	P2L2	3rd pnd	6.5	1.2	106	57	1576	45000	3+	LN	DIVC	D
6	Sharmila	22	18775	G5P1L0A3	31	10.2	7.2	626	755	9400	45000	3+	LN	DIVC/MODS	D
7	Gajalakshmi	25	15523	P1L2 TWINS	1 Pod	9.6	0.8	368	37	420	120000	3+	LSCS	APE/DIVC	D
8	Vadivukarsi	29	13063	PRIMI	34	8.8	0.9	840	858	8640	10000	2+	LN	IVH	D
9	Gomathy	23	7694	P1L1	2 Pod	8.5	1	135	94	1824	49000	2+	LSCS	DIVC	D
10	Dhanalakshmi	19	7487	PRIMI	38+5	12	0.8	144	53	4176	34000	3+	LSCS	PE	D
11	Kuttiammal	35	1659	P4L3	1 Pod	8.5	6.1	91	26	1557	63000	3+	LSCS	A/DIVC	D
12	Rekha	25	4076	G5P1L0A3	2 Pod	9.21	2	72	86	8672	20000	1+	LSCS	PRES	D
13	Vijashanthi	22	10387	PRIMI	38+5	5.5	3.3	436	363	9462	18000	4+	LSCS	PE/DIVC	D
14	Hajeema Bee	28	28968	G2P1L1	35+5	7.8	0.8	61	32	2193	44000	3+	LSCS	RD	D
15	Deepa	25	27272	PRIMI	38+3	6.3	2.3	1380	620	9867	18000	4+	LSCS	DIVC	D
16	Jothi	30	3586	G2P1L1	28+6	10.9	0.8	714	149	1876	60000	3+	LSCS	A/DIVC/ATN	D
17	Gajalakshmi	25	15023	P2L2	2 Pod	9.8	1.2	368	137	580	120000	4+	LSCS	IPE/DIVC	D
18	Sharmila	22	18775	G5P1L0A3	31	10.9	7.2	650	755	9400	45000	4+	LSCS	DIVC/A/MODS	D
19	Saranya	27	258589	PRIMI	33	15.2	0.8	257	118	7750	22000	4+	LSCS	PE	D
20	Malathy	28	32285	G2P1L1 TW	33+6	13.1	14	8178	4376	9300	16410	4+	LSCS	DIVC/CA	D
21	Anitha	29	32861	G2A1	38+2	11.5	0.8	415	695	380	150000	4+	LN	DIVC	D
22	Revathy	25	32297	PRIMI TW	38	9.6	3.7	1359	888	6750	41000	3+	LSCS	DIVC	R
23	Umamaheswari	31	12779	PRIMI	37	14	1.9	481	146	2320	81000	4+	LN	APE/ICH	D
24	Logeswari	19	23694	PRIMI	30+6	10	0.8	64	222	7876	22200	3+	SE	PE	D
25	Jackuline Badsadh	29	5066	P3L2	34+1	8.7	6.7	417	183	8600	99000	4+	LSCS	PPE	D
26	Sudha	23	1046	P1L1	37	8.1	0.8	188	40	6400	28000	4+	LSCS	ATN	D
27	Nandhini	25	13832	PRIMI	34	11.4	0.8	112	68	3260	68000	3+	LSCS	DIVC	R
28	Shobana	27	15833	G2A1	36	8.5	0.8	114	76	1832	86000	3+	LSCS	APE	R
29	Nandhini	28	3848	PRIMI	35+4	13.1	1.9	70	80	786	53000	3+	LSCS	DIVC	R
30	Sara	20	3657	PRIMI	34	8	6.8	65	55	1836	32000	3+	LSCS	A	R
31	Jayaseetha	33	8871	G5P1L1A3	38+5	12	0.8	54	68	934	70000	3+	LN	APE	R
32	Rekha	30	4226	P1L0	32	12.3	0.9	48	60	886	63000	4+	LN	PRES/A	R
33	Kalavathy	32	4597	G3P1L1A1	36+4	12.7	2.2	52	68	1324	61000	3+	LN	DIVC/A	R
34	Gayathiri Gajendra	21	5932	P1L0	33+2	8.6	1.6	81	23	1142	36000	4+	LSCS	A	R
35	Sridevi	25	5955	P1L1 2nd PNI	PP	9	0.5	211	129	1576	63000	4+	LSCS	E	R
36	Kalaivani	26	6247	G3P1L0A1	34	14	0.9	30	13	1875	56900	4+	LSCS	RF	R
37	Ayisha	22	7558	P1L1	PP	11	0.8	126	248	1976	46000	4+	LSCS	PE	R
38	Selvi	23	1198	P1L1	PP	7.3	1.4	326	485	554	38000	4+	LSCS	DIVC	R
39	Pushpa	26	6971	P2L2	36+5	10.5	1.6	86	276	956	56000	3+	LSCS	A	R
40	Subhalakshmi	41	3803	PRIMI	26	10.5	1.2	194	536	3200	56000	3+	H	A/DIVC	R
41	Alamelu	46	4009	G2A1	27	9.3	1.4	99	934	866	100000	2+	H	A/PE	R
42	Swathi	23	8768	P1L0A3	28+2	85	2.4	748	994	7846	36000	4+	H	A	D
43	Sathya	25	36155	PRIMI	36	12	0.8	476	524	322	100000	2+	LSCS	APE	R

MATERNAL OUTCOME IN HELLP SYNDROME

44	Maheswari	38	4685	G5P1L0A3	34+3	11	1.9	74	86	8460	36000	3+	LSCS	APE	R
45	Venkatalakshmi	32	36521	P2L2	PP	10.2	0.9	324	786	1860	45000	4+	LN	DIVC	R
46	Pavithra	19	4524	PRIMI	27	8.5	2.4	664	738	9400	38500	4+	H	DIVC/PE	D
47	Kumudha	27	34251	G2P1L1	32	10.6	2.8	68	78	5860	56000	3+	LN	DIVC/APE	R
48	Lavanya	25	22541	G3A2	35	9.4	1.2	138	248	680	100000	2+	LSCS	APE/PPE/PE	D
49	Sarikala	19	8362	PRIMI	33+2	102	0.8	70	58	1820	75600	3+	LSCS	PPE	R
50	Selvi	28	7843	PRIMI	34+1	105.5	1.2	526	782	5200	35000	4+	LSCS	A/APE	R
51	Saraswathi	28	23636	PRIMI	37+1	9.6	0.9	986	744	284	100000	3+	LSCS	PE	R
52	Suguna	20	23944	P1L1	PP 4th	10.6	2.1	844	176	1560	45000	3+	LSCS	PE	R
53	Padma	35	24780	G2P1L1	38+1	11.4	0.8	264	356	470	35000	3+	LN	DIVC	R
54	Anjali	20	26129	P1L1	PP 3rd	9.6	0.8	170	480	520	120000	3+	LSCS	RF	R
55	Angeldevi	21	25412	P1L1	PP 2nd	8.5	0.9	380	750	230	110000	3+	LN	PE	R
56	Ramadevi	20	24680	P1L1	PP 4th	6.2	2.4	878	784	9000	30000	3+	LSCS	PRES	R
57	Vimala	30	19521	P1L1	PP 3rd	11	0.9	58	56	280	36000	2+	LSCS	E	R
58	Revathy	34	3641	P1L1	PP 2nd	10.4	0.8	924	386	250	110000	2+	LN	DIVC	R
59	Thanjiyammal	26	3576	G2P1L1	35	9.2	2.6	412	311	8900	32000	3+	LN	DIVC	R
60	Lavanya	20	3839	P1L1	S	8.6	2.4	958	1560	7600	58000	3+	LSCS	RF	R
61	Paramehwari	36	3923	G3P2L2	33+2	10.8	0.8	56	48	1200	56000	3+	LN	APE	R
62	Pandeshwari	25	4741	G2P1L1	35+2	11.2	0.8	740	560	580	58000	4+	LSCS	PPE	R
63	Lakshmi	28	5241	P2L1A1	PP 4th	9.6	0.8	786	840	400	120000	2+	LN	PPE	R
64	Akiya Azthar	25	5949	P1L1	PP 10th	8.2	1.4	48	52	8600	88000	2+	LN	DIVC	R
65	Lakshmi	28	2475	P2L1	PP 8th	10.1	0.8	334	280	2409	120000	2+	LSCS	DIVC/PRES	R
66	Jayashree	19	2567	PRIMI	27+2	8.6	2.4	386	522	500	120000	3+	H	A/DIVC	R
67	Uma	26	10800	G2P1L1	36	10.2	0.8	48	52	6000	45000	3+	LSCS	APE	R
68	Manimozhi	24	16035	G2P1L1	38	10.2	0.8	782	1480	8600	98000	3+	LSCS	PPE	R
69	Subathira	35	3842	PRIMI	34+1	9.8	2.1	75	85	5600	45000	4+	LN	APE	R
70	Durgadevi	24	9212	G2P1L1	39+2	11.2	0.8	52	48	1840	56000	3+	LSCS	ATN/RF	R
71	Velpushpam	30	8365	P3L2	PP 4th	10.8	0.9	930	840	400	110000	2+	LSCS	PPE	R
72	Pushpa	26	15431	P3L2	PP 5th	10.2	0.8	482	560	280	120000	2+	LSCS	PRES	R
73	Sahakeerthini	25	7211	P2L2A3	PP	11.4	2.1	58	46	9600	56000	2+	LSCS	PPE	R
74	Nandhini	25	18323	PRIMI	38+2	9.6	1.2	565	844	900	100000	3+	LSCS	APE	R
75	Shobana	27	15833	G5P1	36	10.2	2.1	58	44	2600	56000	2+	LSCS	DIVC	R
76	Madhuravani	21	1124	PRIMI	24	9.8	2	934	866	4500	46000	3+	H	DIVC	R
77	Savithiri	19	16456	G2A1	27+2	8.6	3.4	1934	794	7400	52000	4+	H	DIVC	R
78	Rekha	30	1325	G4P1L1A2	38+2	10.2	0.8	484	760	680	100000	2+	LN	PPE	R
79	Deepa	24	35862	PRIMI	34+2	7.1	1.12	131	60	1240	50000	3+	LSCS	APE	R
80	Narayani	20	234	G2P1L1	33	8.5	1.2	786	888	6400	30000	3+	LSCS	PE	R
81	Alamelu	46	261	G2A1	27	9.4	0.8	546	620	2600	120000	3+	H	DIC	R
82	Nandhini	28	854	P3L2	3 POD	11.2	0.8	46	28	780	110000	3+	LSCS	PPE	R
83	Kousalya	19	362	PRIMI	36	11.2	0.8	232	132	960	96000	3+	LN	DIC	R
84	Mariammal	25	468	P1L1	PP 4TH	10.2	1.2	48	36	1200	78000	3+	LSCS	PPE	R
85	Amala	23	526	P1L1	PP 4TH	10.2	0.8	380	586	58	110000	3+	LN	PE	R
86	Sathya	25	1432	PRIMI	36	8.2	1.2	458	788	9400	24000	3+	LSCS	PPE	R

FETAL OUTCOME

S.no	BABY OUTCOME	SEX	MATURITY	BABY WT(kg)	APGAR >7	R/D
1	TWIN 1	BOY	TERM	2	YES	R
	TWIN 2	GIRL	TERM	2	YES	R
2	ALIVE	GIRL	TERM	2.75	NO	R
3	ALIVE	BOY	PRETERM	1.61	NO	D
4	ALIVE	GIRL	PRETERM	2.17	NO	D
5	ALIVE	BOY	TERM	3	YES	R
6	IUD	BOY		1.25	NO	D
7	TWIN 1	BOY	TERM	2.25	NO	R
	TWIN 2	BOY	TERM	2.5	YES	R
8	IUD	GIRL	TERM	1.8		
9	ALIVE	BOY	TERM	2.3	YES	R
10	DEAD BORN	GIRL	TERM	2.5		
11	DEAD BORN	BOY	TERM	2.5		
12	ALIVE	BOY	PRETERM	1.31	NO	D
13	ALIVE	BOY	TERM	1.9	NO	R
14	ALIVE	BOY	PRETERM	2.5	YES	R
15	DEAD BORN	GIRL	TERM	3.25		
16	DEAD BORN	GIRL	PRETERM	1.75		
17	TWIN 1	BOY	TERM	2.25	NO	R
	TWIN 2	BOY	TERM	2.5	YES	R
18	IUD	BOY	PRETERM	0.65		
19	ALIVE	GIRL	PRETERM	1.7	NO	D
20	ALIVE	BOY	PRETERM	1.61	NO	R
21	ALIVE	GIRL	TERM	2.75	YES	R
22	TWIN 1	BOY	TERM	2	YES	R
	TWIN 2	GIRL	TERM	2	YES	R
23	DEAD BORN	BOY	TERM	3		
24	IUD	BOY	PRETERM	0.65		
25	ALIVE	GIRL	PRETERM	1.8	NO	D
26	ALIVE	BOY	TERM	3.2	YES	R
27	ALIVE	BOY	PRETERM	2.1	NO	R
28	ALIVE	BOY	PRETERM	1.6	NO	R
29	ALIVE	BOY	PRETERM	2	NO	R
30	ALIVE	GIRL	PRETERM	1.8	YES	R
31	ALIVE	GIRL	TERM	2.5	YES	R

FETAL OUTCOME

32	IUD	BOY	PRETERM	0.65		
33	ALIVE	GIRL	PRETERM	2.2	YES	R
34	IUD	BOY	PRETERM	1.2		
35	ALIVE	GIRL	TERM	3.02	YES	R
36	ALIVE	BOY	PRETERM	1.2	NO	D
37	ALIVE	GIRL	TERM	2.85	YES	R
38	ALIVE	BOY	TERM	3.1	YES	R
39	ALIVE	BOY	PRETERM	2.4	NO	R
40	IUD	BOY	PRETERM	0.45		
41	ALIVE	GIRL	PRETERM	0.75	NO	D
42	IUD	BOY	PRETERM	0.65		
43	ALIVE	GIRL	PRETERM	2.2	NO	R
44	ALIVE	BOY	PRETERM	1.8	NO	R
45	ALIVE	BOY	TERM	2.1	YES	R
46	IUD	BOY	PRETERM	0.5		
47	ALIVE	BOY	PRETERM	1.3	NO	D
48	ALIVE	GIRL	PRETERM	2	YES	R
49	ALIVE	GIRL	PRETERM	1.6	NO	R
50	ALIVE	GIRL	PRETERM	1.65	NO	D
51	ALIVE	BOY	TERM	2.25	YES	R
52	ALIVE	BOY	TERM	2.8	YES	R
53	ALIVE	GIRL	TERM	2.2	YES	R
54	ALIVE	BOY	TERM	2.7	YES	R
55	ALIVE	BOY	TERM	2.1	YES	R
56	ALIVE	BOY	TERM	3.25	YES	R
57	ALIVE	BOY	TERM	3	YES	R
58	ALIVE	GIRL	TERM	2.8	YES	R
59	ALIVE	GIRL	PRETERM	1.9	YES	R
60	ALIVE	BOY	TERM	2.995	YES	R
61	ALIVE	BOY	PRETERM	1.26	NO	D
62	ALIVE	BOY	PRETERM	2.25	YES	R
63	IUD	BOY	PRETERM	1		
64	ALIVE	GIRL	TERM	1.975	YES	R
65	IUD	BOY	PRETERM	1.2		
66	IUD	BOY	PRETERM	0.48		
67	ALIVE	BOY	PRETERM	1.22	NO	D

FETAL OUTCOME

68	ALIVE	GIRL	PRETERM	1.66	YES	R
69	ALIVE	BOY	PRETERM	1.8	NO	R
70	ALIVE	BOY	TERM	2.8	YES	R
71	ALIVE	BOY	TERM	3	YES	R
72	ALIVE	GIRL	TERM	2.3	YES	R
73	ALIVE	GIRL	TERM	2.7	YES	R
74	ALIVE	GIRL	TERM	2.5	YES	R
75	ALIVE	GIRL	PRETERM	1.8	NO	R
76	ALIVE	BOY	PRETERM	0.68	NO	D
77	IUD	BOY	PRETERM	0.4		
78	ALIVE	GIRL	TERM	2.3	YES	R
79	ALIVE	GIRL	PRETERM	1.8	NO	R
80	ALIVE	BOY	PRETERM	1	NO	D
81	IUD	BOY	PRETERM	0.85		
82	ALIVE	GIRL	TERM	2.8	YES	R
83	ALIVE	GIRL	PRETERM	2.6	YES	R
84	ALIVE	GIRL	TERM	2.8	YES	R
85	ALIVE	BOY	TERM	2.1	YES	D
86	ALIVE	BOY	PRETERM	2.2	YES	R

ABBREVIATIONS

HELLP	Hemolysis Elevated Liver Enzymes, Low Platelets
SGOT	Serum glutamic oxaloacetic transaminase
SGPT	Serum glutamic pyruvic transaminase
AST	Aspartate amino transaminase
ALT	Alanine amino transaminase
TNF	Tumor necrosis factor
IL	Interleukins
MCP-1	Monocyte chemoattractant protein-1
VEGF	vascular endothelial growth factor
PDGF	Platelet derived growth factor
AGT	Angiotensinogen
NOS	Nitrous oxide
Glu	Glutamine
F-2	Coagulation factor II – Prothrombin
ACE	Angiotensin converting enzyme
PGI 2	Prostacyclin
ET	Endothelin
PIGF	Placental growth factor
Flt	Fms like tyrosine kinase
Eng	Endoglin
kDa	Kilo Dalton

CD	Cluster of differentiation
TGF	Transforming growth factor
DIVC/DIC	Disseminated intra vascular coagulation
PA	Placental abruption
ARDS	Adult respiratory distress syndrome
CNS	Central nervous system
CT	Computed tomography
MRI	Magnetic resonance imaging
LDH	Lactate dehydrogenase
CMP	Complete metabolic panel
CBC	Complete blood count
PT	Prothrombin time
PTT	Partial thromboplastin time
BOH	Bad obstetric history
ROC	Receiver operating Curve
LSCS	Lower segment caesearean section
VD	Vaginal delivery
MOD	Mode of delivery
AUC	Area under the curve
APE	Antepartum eclampsia
PPE	Postpartum eclampsia
PA	Placental abruption

PE	Pulmonary edema
PRES	Posterior reversible encephalopathy syndrome
RF/ARF	Acute renal failure
ATN	Acute tubular necrosis
GA	General anaesthesia
IUD	Intra uterine death
IUGR	Intra uterine growth restriction
BW	Birth weight
IOG	Institute of Obstetrics &Gynaecology
BP	Blood pressure

INSTITUTIONAL ETHICS COMMITTEE
MADRAS MEDICAL COLLEGE, CHENNAI-3

EC Reg No.ECR/270/Inst./TN/2013
Telephone No. 044 25305301
Fax : 044 25363970

CERTIFICATE OF APPROVAL

To
Dr.V.Rekha
Post Graduate M.S.(Obstetrics & Gynaecology)
Madras Medical College
Chennai 600 003

Dear Dr.V.Rekha,

The Institutional Ethics Committee has considered your request and approved your study titled **"A study of fetomaternal outcome in HELLP syndrome complicating pregnancy" No.14042015.**

The following members of Ethics Committee were present in the meeting held on 07.04.2015 conducted at Madras Medical College, Chennai-3.

1. Prof.C.Rajendran, M.D.,	: Chairperson
2. Prof.R.Vimala, M.D., Dean, MMC, Ch-3	: Deputy Chairperson
3. Prof.B.Kalaiselvi, M.D., Vice-Principal, MMC, Ch-3	: Member Secretary
4. Prof.B.Vasanthi, M.D., Prof. of Pharmacology, MMC	: Member
5. Prof.P.Ragumani, M.S., Professor of Surgery, MMC	: Member
6. Prof.S.Baby Vasumathi, Director, Inst. Of O&G, MMC	: Member
7. Prof.K.Ramadevi, Director, Inst.of Biochemistry, MMC	: Member
8. Prof.Saraswathy, M.D., Director, Pathology, MMC, Ch-3	: Member
9. Prof.K.Srinivasagalu, M.D.,Director, I.I.M. MMC, Ch-3	: Member
10. Thiru S.Rameshkumar, B.Com., MBA	: Lay Person
11. Thiru S.Govindasamy, B.A., B.L.,	: Lawyer
12. Tmt.Arnold Saulina, M.A., MSW.,	: Social Scientist

We approve the proposal to be conducted in its presented form.

The Institutional Ethics Committee expects to be informed about the progress of the study and SAE occurring in the course of the study, any changes in the protocol and patients information/informed consent and asks to be provided a copy of the final report.

7/4/15

Member Secretary, Ethics Committee
MEMBER SECRETARY
INSTITUTIONAL ETHICS COMMITTEE
MADRAS MEDICAL COLLEGE
CHENNAI-600 003